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John Doyle - 46
Anthropologia Nova :
OR, A
NEW SYSTEM
OF
ANATOMY.

Describing the
Animal Oeconomy,
AND A
Short **RATIONALE**
Of many
DISTEMPERS
Incident to
HUMAN BODIES.
Illustrated with above Fourscore Figures,
drawn after the Life.

By **JAMES DRAKE**, M. D. late
Fellow of the College of Physicians and *F. R. S.*

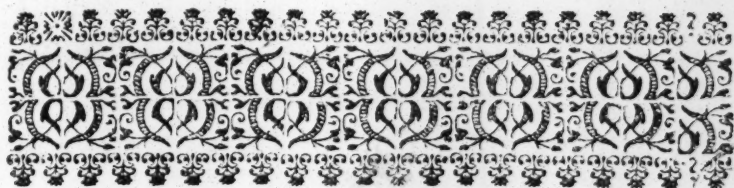
The **THIRD EDITION** with Additions.

WITH
A PREFACE by **W. WAGSTAFFE**, M. D.
and Reader of Anatomy at *Surgeon's-Hall.*

VOL. I.

LONDON: Printed for **W. and J. INNYS**, at the
West End of *St. Paul's.* **MDCCLXXVII.**





THE
PREFACE.



T is an Unhappiness that amidst the Multitude of Authors in *Anatomy*, from the time of its Infancy to this Day, there are so few who have treated it with a laudable Exactness, or suitable to the Dignity of the Subject. For an *Anatomist* ought to have not only a Penetration and Sagacity requisite for the making Discoveries, and a Strength of Judgment and Readiness of Conjecture to reason on them, but to be endow'd also with a Talent of expressing his Notions with Advantage, and, as they are to himself, of rendering them intelligible to other People.

That we are indebted to the skill and accuracy of the Hand and the *Use of the dissecting Knife*, the present Age, and our own Nation in particular, and furnish us with

The P R E F A C E.

many Instances. There are some *Physicians* among us, as well as those to whom this *Province* more peculiarly belongs, who are such excellent Masters in this Art, that as they want not the Commendation of their Country-men, so they are not afraid of the Criticism of Foreigners.

But no one, I am sure, ought to set up for an Author, or indeed for an *Anatomist*, until he is able to enter upon the *Rationale*, and to enquire into the Nature and Causes of those *Phænomena*, which the *Cunning* of his Hand discovers to him. For, notwithstanding he may be vers'd in the *Anatomical Encheiresis*, he may find perhaps that he is unqualified for drawing Consequences and Conclusions; that his Head is not altogether so ready as his Hand, nor his Reason so easy to be managed, as his *dissecting Knife*.

How much and how eminently Dr. *Drake* excelled in all the Qualifications I have mentioned, the Learned World already have been Judges, and Posterity I am persuaded will reap the Benefit of his Labours. There is nothing omitted in this *Edition* except the Chapter on *Fermentation*, and the *Syllabus* at the Beginning of each Chapter, which is still continued in

the Margin; and although our Author may seem less Bulky than he first appear'd, yet he is not less correct in himself, or less serviceable to the Public.

The Chapter on *Fermentation* was of so little use to any but the Chymist, and so foreign an Introduction to the other on *Digestion*, that it was left out by the Approbation of the most eminent and the most accurate *Anatomists* of our Faculty. His Notions, it must be own'd, of the several various Methods of *Fermentation*, and the various *Hypotheses* contriv'd for their Solution, are so many undoubted Instances of his extensive Knowledge, and of his thorough Intimacy with the *Epicurean*, the *Cartesian*, and the *Hermetical* Philosophy. And as he was a Perfect Master of the *Operations* of the latter, so none has with better Argument, or clearer Demonstration unfolded the Incongruity of their *Principles*, in relation to Natural Philosophy, or shewed the precariousness of their Art. But all this, however Rational, is extreamly inconclusive when apply'd to the Mechanism and Motions of the human *Fabric*, when *Animal Fermentation*, if there be any such thing, is very different from what he has describ'd, and especially when in the Chapter on *Digestion*, he rejects all the *Ferments*

and various *Menstrua* of the Stomach, as the Product only of the Imagination.

And here the Reader will be inform'd of many things concerning the manner of *Digestion*, as well as the various *Organs* of it, which, if they will not serve for his Use, will contribute at least to his Entertainment. The *Comparative Anatomy* of the *Ventricles* of the several Kinds of Animals gives a light into the Act and Uses of *Mastication*, and the many various ways by which the Aliment is dissolved, are perhaps enquired into, and discussed with a force of Reason, and a Maturity of Judgment becoming the Character of a *great Genius*.

But after all, it may be justly questioned whether, when he has destroy'd the *Hypotheses* of those who went before him, his own *Principle of Dissolution* is not likely to undergo the same Fate; or whether in a Doctrine so *Conjectural* as this, there can be any thing advanced, that is not liable to Objection. The manifold Inventions of the present Age are owing undoubtedly to a liberty of thought, and the Freedom of philosophizing, and an Error in an Author may sometimes give an hint, that may pave the way for the most valuable Discovery.

It must be confessed indeed that the Chapter on the *Menses* is altogether inconsistent and erroneous, but as he has pointed out the Opinions of Dr. *Charlton*, *De Graaf*, and others in this Subject, and especially that of Dr. *Freind*, it would be highly improper to omit it. The *Hypothesis* of the last, which is so mechanically and so admirably calculated for accounting for all the Symptoms and Distempers proceeding from the *Catamenia*, is abridged in such a Manner, as will be an Incitement to any one, who has any Curiosity to peruse at large that excellent * Performance, which stands irrefragable amidst the Batteries of Argument, and appears the more Rational, the more it has been assaulted.

As to any other Pieces of this Work, for my part I know of no Objection that is material; the Sentiments of others are candidly and ingenuously delivered by him, and like one who thoroughly understood them; and whenever he disagrees with,

* *Emmenologia: in qua Fluxus Muliebris Menstrui Phænomena, Periodi, Vitia, cum medendi Methodo, ad Rationes Mechanicas exiguntur. Auctore Johanne Freind, M. D. Coll. Med. Londin. & Soc. Reg. Socius. Editio secunda auctior & emendatio. 8vo. 1717.*

or assents to their Conjectures, or proposes any thing of his own, he gives his Reasons with the utmost Impartiality, without the Triumph and Ostentation of a Conqueror, or any fond Opinion of his own Merit.

If the Chapter on the *Motion of the Heart, and the Use of Respiration*, together with that on *Sanguification, Nutrition*, and some others are consulted, we shall find he does not behave himself like a meer Describer of the Parts, but like an unprejudic'd Enquirer into Nature, and an absolute Master of his Profession. And if Dr. *Lower* has been so much and so deservedly esteem'd for his Solution of the *Systole* of the Heart, Dr. *Drake* by accounting for the *Diastrale*, ought certainly to be allowed his share of Reputation, and to be admitted as a Partner of his Glory.

It were to be wish'd that every one who Publishes his Observations on the *Microcosm* of Man was endow'd with the same reach and compass of Understanding, and the same Perspicuity of Judgment, as these celebrated Professors of our Faculty: For the Generality of Authors are only *Copiers* and *Collectors*, who are dress'd up, and look considerable in the very Plunder and
Rob-

Robberies they have committed, and have nothing of their own to boast of, but some frivolous Subdivision of a *Membrane* or a *Muscle*, or some pedantic Alteration of a *Term of Art*.

Thus as *Anatomy* has been handed down to us through so many succeeding Ages, and in Variety of Languages; so by the Fondness of Authors for their own Discoveries, or to make them pass as such, the *Terms* of it are multiply'd till they are grown burthensome, and a single *Bone* or a *Muscle* distinguish'd by a Train of Titles, and attended with all the Equipage of *Processes* and *Foramina*.

We are already so well acquainted by the help of Microscopes and Injections, with the Parts themselves, that there is little more to be discovered in respect either to their Structure or Situation; and if we consider what of late Years have been communicated to the World as so many Discoveries of Importance, we shall find them little else than some *Lusus Naturæ*, some Variety in the Origination and Insertion of the Parts, or some fictitious Sketches of the Imagination, and the Product of a *Technical* Exuberance.

As

As the Contexture of the Blood and Juices, and the different Figure of their Particles are invisible, and as we have no other Rule but our own Reasonings to guide us in explaining 'em; so they will leave us generally at such Uncertainties in solving the Mechanism of our Frame, as will scarcely ever be adjusted, either, by Time, or by Experience. Human Reason assisted with all the Invention of our Fancy, and the Contrivances of Art is too narrow, too Incompetent a Judge of the hidden Mysteries of our *Fabric*; and whatsoever is indiscoverable to the Senses, will never be received as a *Maxim*, or pass upon the World as an indisputable Truth.

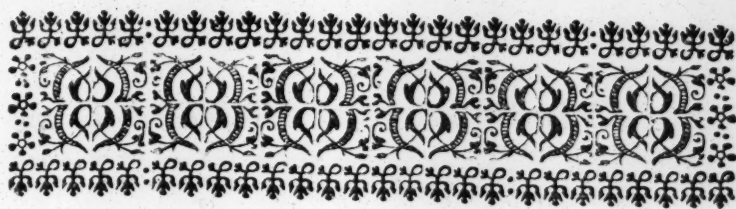
The Manner of *preparing* and *injecting* the *Viscera*, gives an insight into the Communications of the *Capillary* Vessels, and from thence, perhaps, we may frame a better and more distinct Idea of the functions, tho' not of the Contexture of the *Fluids*. But the Misfortune is, that those who have been Masters of the best *Injections*, instead of using and applying them as they ought, have oftentimes contented themselves with barely shewing their *Preparations* as a Curiosity, or as an Entertainment only for Conversation. As
if

if it was of less Importance to Mankind to trace out the intricate and most minute *Meanders* of the Body, and the Laws of *Animal Secretion*, than by keeping their *Injections* as so many *Arcana* to favour of *Empiricism*, and to obstruct the Improvements of the Faculty. Dr. *Ruysch* has given us in his *Thesaurus* several excellent and curious Drawings of the finest *Preparations* in the World; but we had certainly been more obliged to him, if he had communicated his Observations on the Manner of *preparing* them, and form'd from thence a noble, a just and a demonstrative *Rationale* of the Uses of the Parts, and the Morbid Alterations of our Frame. One useful Discovery is worth a Thousand *Sculptures*, when applicable to the Cure of a Distemper, and the settling the Foundations of our Practice.

Those who are unacquainted with, or have not Opportunity for Dissection, reap a vast Advantage from this Art; and that it might not seem to be neglected, there are added several *Figures* in the *Appendix*, with proper Explications and Amendments. The Reader therefore in this Volume will have all the Advantages he can desire; he will have a general *System* of *Anatomy*, and a studied Treatise on it, a
De-

Description of the Parts, and a *Theory* deriv'd from them: What Monsieur *Bourdon*, and Doctor *Keil*, what *Malpighi* and *Verheyen*, what *Vesalius*, *Bidloo*, *du Verney*, Mr. *Cowper*, and others of the great Reformers of this Science, have delivered to us ; are compris'd, commented on, and frequently improved by our Author, in the most methodical Discourses, and the most elegant Delineations.

How far he was capable of performing every thing of this Nature I have already shewn; and I forbear to Preface any farther in his Behalf, lest I should too widely deviate from that fulness of good Sense, so remarkable throughout his Works, at the very time I am commending it in him, and be guilty of too much Prolixity in his Character, who abhorr'd it.



THE CONTENTS.

Vol. I. BOOK I.

CHAP. I. <i>Of the general Constituent Parts of the Body.</i>	Page 1
Chap. II. <i>Of the Cuticle, or Scarf-Skin</i>	11
Chap. III. <i>Of the Skin</i>	13
Chap. IV. <i>Of the Membrana Adiposa and its Fat, and of the Carnosa, seu Musculosa</i>	19
Chap. V. <i>Of the Muscles of the Abdomen</i>	22
Chap. VI. <i>Of the Peritonæum</i>	25
Chap. VII. <i>A View of the Viscera of the Abdomen in their Natural Situation, &c.</i>	28
Chap. VIII. <i>Of the Omentum, or Caul</i>	31
Chap. IX. <i>Of the Oesophagus</i>	36
Chap. X. <i>Of the Stomach.</i>	42
Chap. XI. <i>Of the Intestines</i>	47
Chap. XII. <i>Of the Mesentery, Lacteal Veins, Receptaculum Chyli, and Ductus Thoracicus Chyliferus</i>	53
Chap. XIII. <i>Of Digestion and Chylification, and the Apparatus thereunto conducting</i>	48

Chap.

The CONTENTS.

Chap. XIV. <i>Of the Pancreas</i>	93
Chap. XV. <i>Of the Spleen</i>	95
Chap. XVI. <i>Of the Liver, Gall-Bladder and Ducts</i>	99
Chap. XVII. <i>Of the Kidnies, and Glandulæ Renales</i>	110
Chap. XVIII. <i>Of the Urinary Bladder and Urethra</i>	113
Chap. XIX. <i>Of the Parts of Generation proper to men; viz. The Spermatick Vessels, The Testicles, The Paraftatæ, The Vasa Deferentia, The Vesiculæ Seminales, and the Scrotum</i>	115
Chap. XX. <i>Of the Penis</i>	127
Chap. XXI. <i>Of the Organs of Generation in Women</i>	146
Chap. XXII. <i>Of the Placenta Uterina, the Umbilical Vessels, the Membranes that involve the Fœtus, and the Liquors that they contain, the Situation of the Fœtus in the Womb, the Legitimate Time, the Nourishment of the Fœtus, the Difference between a Fœtus before Birth and after</i>	167
Chap. XXIII. <i>Of the Catamenia, or Menses</i>	176
Appendix.	

VOL. II. BOOK II.

Of the Parts of the Thorax, or Middle Venter.

CHAP. I. <i>Of the Mammæ, or Breasts</i>	189
Chap. II. <i>Of the Diaphragm</i>	192
Chap. III. <i>Of the Pleura and Mediastinum</i>	194
Chap. IV. <i>Of the Thymus</i>	195
Chap.	

The CONTENTS:

Chap. V. <i>Of the Heart and Pericardium</i>	196
Chap. VI. <i>Of the Aspera Arteria and Lungs</i>	203
Chap. VII. <i>Of the Motion of the Heart, and use of Respiration</i>	212
Chap. VIII. <i>Of Sanguification and Nutrition</i>	239

BOOK III.

Of the Head.

CHAP. I. <i>Of the containing Parts of the Head</i>	268
Chap. II. <i>Of the Meninges, or Membranes con- taining the Brain</i>	271
Chap. III. <i>Of the Brain</i>	273
Chap. IV. <i>Of the Medulla Oblongata, its Nerves, Blood-Vessels, and other Appendices</i>	277
Chap. V. <i>Of the Cerebellum</i>	284
Chap. VI. <i>Of the Medulla Spinalis</i>	287
Chap. VII. <i>Of the Nerves which have their Ori- gin within the Skull</i>	291
Chap. VIII. <i>Of the Nerves from the Spinal Mar- row</i>	302
Chap. IX. <i>Of the Face</i>	305
Chap. X. <i>Of the Nose, by Mr. William Cowper</i>	ibid.
Chap. XI. <i>Of the Eyes</i>	321
Chap. XII. <i>Of the Ear</i>	327
Chap. XIII. <i>Of the External Parts of the Face</i>	341
Chap. XIV. <i>Of the Inner Parts of the Mouth</i>	346
Chap. XV. <i>Of the Os Hyoides and Tongue</i>	350
Chap.	

The CONTENTS.

Chap. XVI. <i>Of the Bones in General.</i>	362
Chap. XVII. <i>Of the Connexion of the Bones</i>	364

BOOK IV.

CHAP. I. <i>Of the Muscles and Mucilaginous Glands in General</i>	367
Chap. II. <i>Of the Bones and Muscles of the Head</i>	374
Chap. III. <i>Of the Bones and Muscles of the Jaws</i>	383
Chap. IV. <i>Of the Bones and Muscles of the Neck</i>	393
Chap. V. <i>Of the Bones of the Back, and other Parts of the Thorax, and their Muscles</i>	396
Chap. VI. <i>Of the Clavicles, Shoulder-Blades, Bones of the Shoulders, Arms, Hands and Fingers, with their Muscles</i>	405
Chap. VII. <i>Of the Bones and Muscles which form the Lower Venter or Region of the Trunk</i>	425
Chap. VIII. <i>Of the Bones and Muscles of the Thigh, Leg and Foot</i>	432
<i>A General Index.</i>	





A New



SYSTEM OF ANATOMY.

BOOK I.

CHAP. I.

Of the General Constituent Parts of the Body.



ANATOMY is the Art of *Dissecting*, or artificially taking to Pieces the solid Parts of *Animal Bodies*, in order to an exact discovery of their Structure.

It is often divided into *Speculative* and *Practical*, a Division which I think not very momentous, and therefore shall not insist upon.

The Subject of it is a *Humane Body*: And tho' *Brutes* and other *Animals*, and sometimes *Vegetables*, fall under its Consideration, it is only (with *Physicians* at least) in order to illustrate the former; and is called *Comparative Anatomy*.

Anatomists have usually divided the *Body* into Parts *Organical* and *Inorganical*, *Similar* and *Dissimilar*, *Spermatick*, &c. but to what use, or with how much Instruction, is not very apparent to me, who am apt to think such Distinctions

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only

only burthensome to the Memory, and not very edifying.

Necessary Division. However, there is a Division, which is not to be neglected, which is into such Parts, as will have frequent occasion to be mentioned in the following Discourses, that are capable of a General Definition, which would not be proper so often as the mention of them will particularly recur. It will however be absolutely necessary for the benefit of Learners (for whose sake such Treatises as this are written) that a General Idea be given of them, before they come to read of them separately.

Enumeration of the Solid Parts. The whole Body consists of *Bones, Cartilages, Ligaments, Membranes, Fibres, Muscles, Tendons, Arteries, Veins, Nerves, Glands, Lymphæducts, Lacteals*, and some other peculiar Ducts, which will be best known by their Descriptions in their proper Places.

Fluids or Humours. Besides these which are the *Solid and Continuous Parts*, there are contained in them divers *Fluids*, such as the *Chyle, Blood, Milk, Fat, Serum, Lymph, Spirits, Bile, Salival, Pancreatick Juice, Seed, &c.*

Bone defined. A BONE is the hardest part of the Body, and the Prop and Support of all the rest, for which end it is fram'd. Its Substance is white, fragil, not distensible, (but in morbid Cases) and void of Sensation. The Bones are all covered with a peculiar Membrane called the *Periosteum*, which is extremely sensible, and many of them are hollow, and fill'd with an oily fat Substance, which is call'd the *Marrow*.

Periosteum. At their ends they are usually capp'd with a white, smooth Substance, somewhat softer than themselves, upon which they move and turn, and which is called a *CARTILAGE*; which in length of time often grows boney, as it is generally found in old People.

To the *Bones* are always annex'd **LIGA-** *Ligament.*
MENTS, which are a *tough, flexile, smooth Sub-*
stance, serving to tie them together, and sometimes
 resembling a *Tendinous* or *Nervous*, sometimes a
Membranous, and sometimes *Cartilaginous* Sub-
 stance, into which, in some *Diseases*, they often
 degenerate.

A **MEMBRANE** is a *thin, white, or transpa-* *Mem-*
rent, flexile, expanded Substance, serving to cover *brane.*
and cloath the other Parts, which is the proper
and peculiar use of it: When it is the covering
 of a *Vessel*, it is called a *Coat* or *Tunic*: Those *Tunic.*
 that cover the *Brain*, are by a peculiar Name
 called *Meninges* or *Matres*; of which more in
 their proper place.

A **FIBRE** (called likewise a *Filament*) is a *Fibre.*
long slender Thread, and, like a Thread, is in the
several Parts variously wound up into a great Di-
versity of Figures. These *Fibres* (according to the
 now prevailing *Opinion*) are all hollow, and per-
 colated by some *Fluid* or other, which renders
 them in effect all *Vessels*. There are four sorts
 of them according to the vulgar *Division*, *Car-*
nous, Nervous, Tendinous and *Osseous*, of one or
 other of which, all the other *Parts* consist.

A **MUSCLE** is a *fleshy Part consisting of Fibres,* *Muscle.*
and serving for Motion. It is ordinarily divided
 into three *Parts*, which are called the *Head*, the
Belly, and the *Tail*, of which the *Head* and the
Tail are generally the *Tendons*, the *Head* being
 that *Extremity* which is fixt to the *Part* most sta-
 ble; the *Tail* to the more moveable. *Muscles*
 are likewise divided into *Simple* and *Compound*; *Simple*
 the *Simple* are those which have but one *Venter* *and Com-*
 or *Belly*; the *Compound* those which have two *pound.*
 or more; or otherwise, the *Simple* are those
 which consist of a *Simple* order of *Fibres*, and
 the *Compound* of *Fibres* variously disposed.

*Venter, or
Belly.*

The *Belly* of a *Muscle* is the *thick, fleshy* part, into which are inserted the *Arteries* and *Nerves*, and out of which issue the *Veins* and *Lymphæducts*.

Tendon.

A **TENDON** is the *hard white* part of a *Muscle*, usually placed at either *Extremity* of the *Muscle*, and co-operating with it in its *Action*. The *Fibres* of this are ordinarily thought to be *Nervous*, but (in my *Opinion*) are only *Productions* of the same *Fibres*, which make the *Belly* of the *Muscle*, but their being more closely and firmly connected, makes the difference of appearance, and their whiteness proceeds only from the *Blood's* being partly excluded by the tightness of their *Texture*; so that there seems to be no other difference between them, than there is between a *Skein* of *Thread*, and a *Cord* made of the same *Thread*. In the *Limbs* one of these *Tendons* is usually fixt to an *unmoveable Point*, the other to a *moveable*; So that when the *Belly* of the *Muscle* in *Contraction* is swell'd and shortned, the *moveable Point* is drawn towards the *immoveable*, by which means *Local Motion* is performed.

Artery.

AN **ARTERY** is a *hollow Fistulous Channel*, conveying *Blood* from the *Heart* to all *Parts*. It ordinarily consists of *three Coats*, or *Membranes*: The outward, *Nervous* or *Tendinous*: The second, *Carnous* or *Muscular*: The third, *Glandulous* or *Vascular*: Through these is all the *Blood* of the *Body* conveyed towards the *Surface*. All *Arteries* begin with a *Trunk*, and growing gradually less and narrower end in *Branches* so minute, that they escape the *Sight*, unless assisted with *Microscopes*; by which, in the *Tails* of *Tadpoles*, and very small *Eels*, the *Extremities* of the *Arteries* seem by the swift uninterrupted course of the *Blood*, to be continued to the *Originations* of the *Veins*, though, through the transparency of those *Vessels*, the actual *Continuation* be not visible.

Its Coats.

visible. The *Coats* of them are of a very firm, close *Contexture*, by which means the *Blood* not being visible through them, they generally appear white. In these the *Blood* proceeding from a greater *Capacity* to a less, is thereby somewhat obstructed in its *Passage*; but being forced on by the *Motion* of the *Heart*, distends the *Coats* of the *Arteries*, and thereby occasions that *salient Motion* which we call the *Pulse*.

A *VEIN* is another *Fistulous Channel*, for the *Vein*. conveyance likewise of *Blood*; but its course is directly opposite to that of the *Arteries*. For instead of a *Trunk* distributed into *Branches*, and *Capillaries*, this is a *Trunk* form'd out of the concurrence of *Capillaries*, which receive the *Blood* from the *Arteries* in the respective *Parts*, and re-convey it to the *Heart*. In these the *Blood* coming from narrow *Channels* into wider, finds less *Opposition*, and therefore less force is requir'd to drive it on. But to supply that want of *Protrusion*, the *Veins*, (especially those of the lower *Limbs*) are furnished with *Valves*, which are two *Membranes* placed opposite to each other in the *Cavities* of the *Veins*, closing 'em against any *reflux* of the *Blood*, and thereby sustaining the weight of it in the great *Trunks*. The impulse of the *Heart* being much broken in the *Capillaries*, and the *Blood* proceeding from narrow to wider *Passages*, the *Veins* have no *Pulsation*. For this reason it was not necessary that the *Coats* should be so strong and firm as those of the *Arteries*. However, they are in their *Texture* alike; but those in the *Veins* being thinner than those in the *Arteries*, and the *Blood* appearing through them, makes them look blue in *Dissection*, and not white.

A *NERVE* is a round, white, long, smooth Body, like a Cord, deriving its Origin from the Brain, or *Spinal Marrow*, and serving (as is supposed) for

the conveyance of Animal Spirits. The *Trunk* of every *Nerve* is covered with a very thin *proper Membrane*, and consists of innumerable slender *Fibres* infinitely divisible, which are dispers'd through every Part of the *Body*, where there is either *Sense* or *Motion*.

Gland.

A **GLAND** is a *soft, spongy, lax Body*, and furnish'd with a little *Excretory Duct*, or *Pipe*, through which it emits that *Fluid* for the *Secretion* of which it is fram'd. It is suppos'd by *Modern Anatomists* to be only a *Convolution* of the *Capillary Artery*, to which a *Capillary Vein* is join'd, which, with the *Excretory Duct*, make up the *Body of Glands*, the *Organs of Secretion*. The *Excretory Ducts* arise from the *Glands*, which they help to compose. They spring from the *Extremities* of the *Arteries* and *Veins*, and carry off a *Liquor* separated from the *Blood*.

The *Lymphatick Glands* have either *Lymphæducts* for their *Excretory Ducts*, or *Lacteal Vessels*, as in the *Mesentery*.

Lymphæducts.

The **LYMPHATICKS**, or **LYMPHÆDUCTS**, are very *small, fine, hollow Vessels*, generally arising from the *Glands*, and conveying back to the *Blood* a *transparent Liquor*, which from the resemblance it in shew bears to *Water*, is called *Lymph*. These, though not so visible as the other *Vessels*, because of their *Minuteness* and *Transparency*, are however existent in all *Parts* of the *Body*: But the difficulty of finding them has hinder'd them from being described in many *Parts*.

Lacteal Veins.

The **LACTEALS** are a *peculiar sort* of *Lymphatick Vessels* for the conveyance of *Chyle*, improperly called *Veins*, proper only to the *Mesentery* and *Intestines*, from whence they arise, and through which they run. They are not always full, at least not of *Chyle*: When they are, which is when the *Aliment* is digested, and before it is passed out of the *Intestina Tenuia*, they appear white, at other times

times transparent, somewhat like the rest of the *Lymphæducts*.

CHYLE is a white Juice about the consistence *Chyle*. of Milk, form'd out of the Parts of the dissolv'd Aliment, incorporated with the Potables by the Peristaltick Motion of the Stomach and Intestines, and thereby diluted, and render'd thin enough to enter the Mouths of the *Lacteals*, whence it is convey'd to the *Receptacle*, and thence unto the Blood, of which it is the first Matter and Substance. The Taste of it, as we have experienced in Dogs, is somewhat brackish, which argues it to abound more with Salts, than Milk does.

MILK is also a white Liquor, but whiter, Milk. thicker and sweeter than the Chyle itself, from which it is deriv'd, and probably without much more Artifice or Alteration, than the leaving behind some aqueous and saline Particles.

BLOOD is a mix'd red Liquor, circulating in Blood. the Arteries and Veins of the Body, which while it is in the Vessels appears uniform: But when let out, and cold, separates spontaneously into a red and a transparent Part, of which the first is call'd *Cruor*, and the latter *Serum*. The *Cruor* consisting *Cruor*. of Parts more Fibrous, is generally gather'd when *Serum*. cold into a *Coagulum*, and swims in the *Serum*, which still retains the Form of a Liquor.

By the Chymical Analysis it is found to consist *Analysis* mainly of *Pblegm*, as the Basis or Vehicle, a great of the Quantity of *Volatile Salts*, a good deal of Oil, *Blood*. and some *Earth* or *Caput Mortuum*, out of which a small Quantity of *Fixt Salt* may be extracted.

By Microscopical Observations, whilst circulating in the Vessels, it is discerned to consist of a *Appearance thro'* great Number of small red Globules, floating in the *Mi-* a transparent Liquor, which are supposed to be *croscopie*. the *Cruor* and *Serum*, which are so distinct when let out. But though the Motion, which is very rapid, may make the *Fibres* or *Filaments* of the

Cruor appear round, and perhaps by a kind of *Whirling* or *Rotation* really convolute them, yet that their *Figure* is not *Globular*, when let out, may fairly be collected from their *Cohæſion*, or *hanging together* in a lump, which *spherical Bodies* touching one another but in a very small *Superficies* are not apt to do. But on the contrary, this *Property* argues an *Implication* of their *Fibres* within one another.

Lymph.

The *SERUM* is ſufficiently deſcribed in the foregoing Article: But it affords another *Liquor* little differing from it, in colour or conſiſtence, or indeed in any other diſcoverable *Quality*: Except that the *Serum* is probably charg'd with more recrementitious *Parts*. This *Liquor* is ſeparated from it poſſibly in all *Parts* of the *Body* for particular uſes, and is return'd again to the *Blood* by peculiar *Ducts* of its own, and is therefore dignified with a ſeparate *Name*, and is call'd the *Lymph*. This ſome would have to be the immediate *Matter* of *Nutrition*, which ſhall be examined in its proper *Place*.

*Animal
Spirits.
Triple Di-
viſion of
Spirits.*

SPIRITS have been antiently diſtinguiſh'd into three ſorts, *Animal*, *Vital*, and *Vegetative*: But the *Moderns* have reduced them to one ſort, viz. the *Animal*: About the *Nature* of which, and the *Matter* whence they are form'd, great *Diſputes* have ariſen among *Anatomists*: Though the *Exiſtence* of them have not yet been demonſtratively prov'd.

*Of doubt-
ful Exi-
ſtence.
Not deſi-
nable.*

It is hard to define what could never yet be brought under the Judgment of our *Senſes*, ſo that every *Man* is at liberty to entertain what *Notions* he pleaſes concerning them, of which ſome have been extravagant enough. All that we ſhall offer concerning them (if they have a real *Exiſtence*) is that they muſt needs be extreme ſubtle *Bodies*, which eſcape all manner of *Examination* by the *Senſes*, though never ſo well aſſiſted,

assisted, and pervade the Tracts of the *Nerves*, which yet have no considerable *Cavity* or *Perforation*, nor could ever by any Experiment be collected, yet are *constantly moving* in vast Quantities, as they must of necessity be, to perform all those mighty Operations, which are ascrib'd to them. However, the Antiquity of the Opinion claims some Reverence: By their help we are supplied with a vast number of *precarious Solutions* of great *Phænomena*; and without them we must leave a great *Chasm* in the *Philosophical History* of *Animal Bodies*. They are supposed to be separated in the *Brain* from the *subtlest* parts of *Blood*, and from thence to be carryed by the *Nerves* to all the parts of the *Body*, for the performance of all *Animal* and *Vital Functions*. But of what peculiar Nature they are, we leave those to wrangle about, who are better satisfied of their Existence.

BILE is a *yellow, bitter Juice, separated from Bile. the Blood in the Liver, and from thence discharg'd by the common Duct into the Duodenum.* It is of *two* sorts, one thinner, more mild, and more inclin'd to a greenish Colour than the other, and is separated from the *Glands* of the *Liver* immediately into the *Porus Bilarius*. The other which is separated from the *Glands* of the *Liver* likewise into the *Gall Bladder*, by *Roots* or *Ducts* proper to itself, is of a *brighter yellow*, of a *greater* consistence, and *more Bitter* and *Acrimonious*.

The *Bile* by *Chymical Analysis* affords some *Sulphur* or *Oil*, some *Volatile Salt*, and a good deal of *Fixt Salt* (in which particular it differs considerably from all other *Animal Liquors*) and a pretty quantity of *Caput Mortuum* or *Earth*, and in this as all the rest, the *Basis* is *Phlegm*.

The *SALIVAL* and *PANCREATICK Juices* resemble one another so nearly in their Quantities and Appearance, that we need not separate them.

Analysis. them in their Descriptions. They are *transparent Liquors*, consisting chiefly of *Phlegm*, mixt with a *Volatile Salt*, and nothing else discoverable. The first separated by the Glands about the *Mouth* and *Fauces*: The latter by the *Pancreas*, which discharges itself into the *Duodenum*.

Seed. The SEED is separated in the Testicles, and contained in proper *Vesicles*, and is when well constituted a *white Liquor*, thicker than any other in the Body, consisting almost entirely of *Oil* and *Volatile Salts*, which are blended together by the Mediation of a little *Phlegm*. Its Activity seems mainly to be deriv'd from the *Volatile Salts*, with which it abounds far beyond any other *Animal Liquor*.

Animal-cules in the Seed. The Use of the *Microscope* has discover'd (as some fancy) floating in it several *Wormlike Bodies*, which move up and down as if they were alive, and have by Mr. *Lewenhoeck*, the first Discoverer of them, and divers others after him, been maintain'd to be real *Animals*, each of them a true *Fœtus*, a little *Man*, whose shape likewise some pretend to discover by their Glasses: Of which Opinion we shall discourse more at large in the proper Place.

Mucus Urethrae. The Genital Parts afford likewise another *Liquor* which is *viscous* and *transparent*, and serves only to *line* and *lubricate* the Parts, that the *Seed* may slip the more freely without adhering. This comes from Glands lately discovered by Mr. *Cowper* about the *Penis*, and is that which in Women is commonly mistaken for the *Semen*.

The *Mucus* of the *Joints*, is a *Mucilaginous Liquor*, separated by its proper Glands, conveniently placed in the *Interstices* of the *Bones*; where these Glands are gently prest by the Motion of the Parts. It serves to make the *Extremities* of the *Bones* or *Joints* slip easily.

The *Mucus* of the *Nostrils* is separated by *Macus* its proper Glands, placed in the internal Mem-^{Narium.}brane of those Parts, which shall be spoken of in its proper Place. As shall,

The *Ear-Wax*, which has also its proper *Ceramen* Glands to separate it from the Blood, placed in *Aurium.* the outward Passages of the Ears.

There are divers other *Excrementitious Humours*, such as the *Urine*, the *Sweat*, &c. which need no Description, and shall be spoken of with the Parts to which they belong.

CHAP. II.

Of the Cuticle or Scarf-Skin.

THE Cuticle is a thin pellucid Membrane, *Cuticle.* void of Sense, and serving as a cover for the Skin.

Though it lies first expos'd to view, yet be-^{Adhe-}cause of its close coherence to the *Skin*, it is ve-^{rence to}ry rarely discern'd from the *Skin* itself, but by ^{the Skin.}*Anatomists*, who generally separate it by an actu-^{Tenuity.}al Caution, by which it appears to be a very thin and simple Membrane, which expos'd to *Squamu-*the *Microscope* (as some pretend) appears to con-^{la.}sist of *Scales*.

But if instead of raising it by an actual Caution ^{Lamellæ.} on a dead Body, we examine that which is rais'd by *Cantbarides*, or any other *Vesicatory*, we shall find it to consist of several Membranes exceedingly thin and fine, and not altogether destitute of Bodies resembling Glands, which in that state ^{Glandulæ.} become visible to the naked Eye.

It is extended over the whole Body, and being it self insensible, serves to defend the subjacent ^{Pores of} Skin which is *extreamly sensible*. It is full of in-^{the Cuti-}numerable *Foramina* or Perforations, as well for ^{cle.}the *Hairs*, as for the *Sweat*, and *Effluvia* of the Body,

Body, which pass by *insensible* Perspiration, yet not so full but that it obstructs that excessive discharge of serous Humours, which otherwise would be evacuated by the Glands of the Skin, as appears plainly by the great Quantities discharged by *Blisters*, or any other Accident, whereby the Skin is denudated.

Origine.

Some would have it to be form'd from the grosser part of the *excrementitious serous Humours* eliminated through the Pores of the Skin, and condens'd upon the Surface, like the *Pellicle* which appears upon Evaporation on the Surface of the *Serum* of the *Blood*.

They that please themselves with this Fancy, are at liberty to enjoy it; because it is not a Point worth controverting. But *Monf. Lervenhoeck* with more probability thinks it to be an Expansion only of the Excretory Ducts of the Glands of the Skin.

It has no proper Vessels, at least none that have been discover'd by Anatomists: Yet having had the Curiosity to examine several times the Cuticle rais'd by *Vesication*, I have always found in it Glands, or Bodies like Glands, which were in that state pretty conspicuous, and pretty numerous, from whence it seems to me certain, that there are Vessels, though not discoverable by the Eye, nor perhaps in *dead* Bodies by the *Microscope*; because of the Coincidence and Flaccidity consequent of Death, which may easily cause Vessels so exceedingly minute to disappear.

I could wish therefore that they who are furnished with good *Microscopes*, would examine the Cuticle taken off by *Vesication*, which I am persuaded would discover something yet unobserved.

C H A P. III.

Of the Skin.

IMmediately under the *Scarf-skin* or *Cuticle* Cutis or Skin. lies a **RETICULAR** Body of *Vessels* peculiar to that part, containing a mucous **Liquor**, Reticular Vessels. from the Tincture of which, the Sagacious *Malpighius* imagines the colour of the Skin to be deriv'd: Which Conjecture he draws from his Observation, that the *Skin* as well as *Cuticle* of *Blacks* is white, and that they differ in no other Circumstance from those of *Europeans*, but in this particular. Structure.

The **SKIN** it self is in several Animals of a Texture very various, as appears by the different sorts of *Leather* made of *Skins*. That of *Hogs* and *Animals*, which have a *Membrana Adiposa* spread immediately under the *Skin*, approaches nearest the *Human*, which upon the score of the vast Multitude of *Sudatory Pores* (far exceeding in number those of *Creatures* cloathed with *Hair*) is more loose and spongy. It consists of *Fibres* of its own, or according to *Steno* is formed out of the Productions of the *Tendons* of the subjacent Parts, and furnished with an infinite Number of **PYRAMIDAL PAPILLÆ**, which are most conspicuous in the *Skin* of the *Soles* of the *Feet*, Papillæ Pyramidales. and of the *Palms* of the *Hands*, and are interwoven with innumerable *Nervous Fibres*, which render it extremely sensible; and thro' those it becomes the immediate and proper *Organ* of the Sense of *Feeling*.

Among these likewise lie a vast Multitude of *Glands*, which are called the **MILIARY** Glandule **GLANDS**, and are each of them serv'd with a *Miliare*. Branch of an *Artery*, *Vein*, and *Nerve*, as also a proper *Excretory Duct*, through which, the matter

matter of *Sweat* and *insensible Transpiration* is secreted, and sent forth at the Perforations of the *Cuticle*.

Lines.

Rhomboidal.

Spiral.

It is mark'd externally with a great number of **LINES**, which intersecting one another at acute Angles, make generally a *Rhomboidal Figure*, though in some places they are turned *Spirally*, as at the ends of the *Fingers*: And in some likewise they are cut deeper, and are more apparent, as in the *Palms* of the *Hands*, and at the *Flexures* of the *Elbow* and *Hams*, and *Soles* of the *Feet*.

Pores of two kinds.

Hairs.

It is perforated every where with **PORES**, which are by *Anatomists* observed to be of two kinds, *greater* and *less*. Through the former of these the **HAIR** germinates, which is implanted with a kind of *Bulbous Root* into the *Papillæ* before-mentioned, as are likewise the **FEATHERS** in *Fowls*.

Thickness.

The *Skin* is by ordinary computation estimated to be about six times as thick as the *Cuticle*: But on the *Head* and *Back*, and under the *Heel* it is much thicker: In the *Palms* of the *Hands* and the *Sides*, on the *Face* and *Forehead*, and especially on the *Lips* it is much thinner.

On the *Face*, *Penis* and *Scrotum* it is softer than elsewhere, and on the *Neck*, *Back* and *Soles* of the *Feet* it is harder. But in different *Subjects* and *Climates* there is in respect of all these things a great *Variety* and *Uncertainty*.

Connective.

It is generally connected to the subjacent Parts by the *Membrana Adiposa*, and its proper *Vessels*, *Arteries*, *Veins*, *Nerves* and *Lymphæducts*, as well where there is no subjacent *Fat*, as where the *Muscles* under it, as at the *Lips*, *Eyebrows*, and *Anus*, send *Fibres* into it.

In some places it adheres so very loosely, that it is easily separated, as about the *Belly*, *Legs* and *Arms*: Tho' in these along the *Linea Alba* it is more firmly connected, and on the *Soles* of the *Feet*,
and

and *Palms* of the *Hands*, so as not to be separated without difficulty. On the *Forehead* it grows to the *Flesh*, and almost all over the *Face*, especially about the *Ears* and *Lips*, where the *Tendons* of the *Muscles* end in it.

The use of it is to wrap up, and cover the *Use*. whole *Body*, and to be a sort of a general *Emunctory*, and a proper *Organ* of Feeling.

Both the *Cuticula* and *Cutis* are liable to several *Diseases*. *Accidents* or *Morbid Alterations*, of which those of the *Cuticula* are most of them of little Moment, and scarce worth minding, but for the Deformity which they bring along with them, such as *Morphew*, *Freckles*, *Sun-burn*, &c. which *Of the Cu-* are ordinarily cured with *Cosmeticks*, with which *ticle*. the *Ladies*, who are most studious of their Beauty, are generally not unfurnish'd.

The *LEPROSY* only, both for its obstinacy *Of the* in resisting all manner of Medicines, as well as *Skin*. for its loathsomeness, and sometimes fatal Consequences, may demand the Consideration of a *Physician*, and properly enough in this place: For, tho' the Root and Cause may justly be *Leprosy*. thought to lie elsewhere, yet the visible seat of it is the *Cuticula*, and Surface of the Skin.

This Distemper arises from the same Cause, *Cause*. that most other Diseases of the *Cuticula*, and *Cutis* do, but in a more exalted Degree; for all of them proceed from thin *Salt* Humours thrown off from the Blood, and arrested by the Density of the *Cuticula*, not affording them so free a Passage as the quantity of them requires. This Disease is much more frequent in hot Countries, than with us, where the Heat of the Sun rarifying extremely the Humours of the Body, and subtilizing the Blood, causes and requires a more liberal Perspiration, in the course of which, the *Salts* (in their own Nature volatile) are still more volatiliz'd, and thereby rendered more Acrimonious.

These

*Lepa
Græco-
rum.*

These *Salts* being by the Appointment of Nature to be eliminated through the Pores of the *Skin*, along with the recrementitious *Serum* their proper Vehicle, are in hot Countries conveyed in greater plenty to the surface of the Body, by reason of the extraordinary Rarity of the Pores from the heat of the *Climate*, than in these *Northern* Regions they ordinarily are, and sticking in their Passage in the thin dry Membrane of the *Cuticle*, the aqueous Parts, which are their Vehicle, slip away from them by insensible Evaporation, and leave them there to corrode and fret it, till at length, through the Quantity so gather'd, the Membrane becomes dry, brittle, and white, which is the true and sole Cause of the *Desquamation*, or falling away in white Scales, which *whiteness* as well as the *brittleness* proceeds merely from the Quantity of these *Salts*, which are themselves white; and when the Moisture is drawn from them, being aculeated, and having insinuated themselves into the Pores of the *Cuticle*, dissolve the Continuity of it by their Points and Edges, which so dried and broken, is apt upon the least Attrition to fall off as in the manner above-mentioned.

Arabum.

There is another kind of this Distemper, which is called *LEPRA ARABUM*, (as the former is *GRÆCORUM*) from the frequency of it in those Countries, which, though different in appearance, carrying a dry Scabby Crust, seems to me however to differ only in degree. For, as in the former Case the Salts being left destitute of their Humidity, which was their Vehicle, are not so active, and therefore affect only the *Cuticle*, to which they are immediately contiguous, or perhaps the Surface of the Skin, which is sometimes made rough and uneven by them; in the latter Case these *Salts* with their Vehicle crowding faster than they can be evaporated through the Pores

Pores of the Skin (being still *in Fluore*, and so more *Cautick*) corrode deeper, and eat not only the *Cuticle*, but the *Excretory Vessels*, and Surface of the *Skin* it self, which thereby spues out a *Liquor* somewhat thicker than usual, which when the thinnest and most aqueous Parts are evaporated, is condensed into that *Crust* or *Scab* which is the *Pathognomonick* of this Disease.

I have chosen to be more particular upon this Disease, because it is the most exquisite of all the *Cutaneous Distempers*, which seem to differ from it in nothing, but the Extent of their Seat, and the Strength and Continuance of their Causes.

Thus the *SMALL POX*, not having its Foundation in any permanent habitual Indisposition, either of the Climate, or Body, has its Period within a limited time, sufficient to extrude the *Peccant Matter* through the Pores of the *Skin*. For in this Disease the *Salt Serum* of the Blood being by an accidental *Fever* (arising from other Causes, than the constant Habit of the Body, or Disposition of the Climate) thrown in great Quantities upon the *Glands* of the *Skin*, acts much after the same manner with the corrosive Matter in the *Lepra Arabum*; that is, it frets the *Cuticle*, and Surface of the *Skin*, much as the other does: But when the Blood is fully despumated, and no fresh extraordinary Supply is sent to these Parts, the *Scabs* dry, and fall off, and the *Skin* recovers its former State, except that the *Eschars* of these *Ulcers*, which were then raised, generally remain visible ever after. Yet sometimes the Matter being not very corrosive, nor very plentiful, the Impressions it leaves are so light, that the *New Cuticle*, that supervenes afterwards, is sufficient to obliterate them. Thus the Cause ceasing, the Effect does so likewise.

If therefore any Body should call the *Small-Pox* a temporary critical *Lepra*, coming upon an

C

extra-

*Most In-
veterate
of all Cu-
taneous
Diseases.*

*The Small-
Pox.*

extraordinary occasion, I see no Reason to impugn his Notion: And though the Treatment be, and ought to be different, it is because more Respect is had to the Internal accidental Cause, than to the External Symptoms, and their Effects upon the Skin.

Why but
once.

Why the *Small-Pox* seldom visits any Person more than once in his Life-time, has been a famous *Problem* much agitated with very little Success; and therefore, if I succeed in my Attempt to resolve it no better than others have done before me, I shall not think it any Loss of Reputation, but shall freely wish others more happy in theirs, when they undertake to reform my Notion.

Alteration
in the
Skin the
Cause.

I conceive therefore that the Alteration made in the Skin by the *Small-Pox*, at whatever Age it comes, is the true Reason why that Distemper never comes again. For the Distention, which the *Glands* and Pores of the Skin suffer at that time, is so great, that they scarce ever recover their *Tone* again, so as to be able any more to arrest the Matter in its Course outwards long enough, or in such Quantity, as to create those *Ulcerous Pustules* which are the very *Diagnosticks* of the *Small-Pox*. For though the same *Feverish* Disposition should, and may again arise in the Blood, yet, the Passages through the Skin being more free and open, the Matter will never be stopt so there, as to make that Appearance, from whence we denominate the *Small-Pox*.

Features
w'y per-
manently
inlarg'd
by the
Small-
Pox.

Accordingly we generally observe, that in those Persons, who have been severely handled by the *Small-Pox*; the *Face* (which is generally the fullest from the Obstruction which the Matter meets with upon the account of the greater Constipation of the Pores of the *Cuticle*, by reason of its being constantly exposed to the Air) seldom returns to its former Dimensions. This Enlargement I think is to be accounted for, from

from the Dilatation of the *Areolæ* of the *Glands*, and Pores of the *Skin*, and not from any Augmentation of the Substance it self.

I am the farther confirmed in this Opinion from the Observation, that Nurses and others, that attend closely upon Persons sick of the *Small-Pox*, are frequently so far affected with the Distemper, as to feel some very light Disorder, and, with or without that Warning, to have two or three Eruptions. That it comes to no more I attribute to the free Course which the Matter has thro' the Pores of the *Skin*. With this also agrees the constant Observation, that People of coarse-grain'd *Skins*, in whom the Pores are largest, are most favourably treated by this Distemper, which likewise constantly leaves fine *Skins* much coarser than it found them.

What has been said of the *Small-Pox*, will *Measles*, suffice to solve the *Phænomena* of the *Measles*, *Scarlet Fever*, and *Erysipelatous Inflammations*, which differ only in Degree or Occasion.

This Course and Effect of these *Salt Serous Humours* are likewise applicable to the *Itch*, and other *cutaneous* Eruptions, which we not designing a formal Treatise of here, leave others to apply as they see Occasion, which it will be easy for them to do.

C H A P. IV.

Of the MEMBRANA ADIPOSITA, and its FAT;
and of the CARNOSA seu Musculosa.

Immediately under the Skin lies the FAT, *Fat* which is called in *Latin* *Pinguedo*, and in *English* by the general Name of *Fat*, in Contradistinction to the *Adeps*, *Serum* or *Suet* and *Leaf*, which are found in the Cavities of the

Abdomen, and differ somewhat from each other in Consistence.

Where
found.

This *Fat* is found all over the Body co-extended to the Skin it self, except on the *Forehead*, the *Eyelids*, *Penis*, and *Scrotum*. In emaciated Bodies, instead of this *Fat*, we find a Sort of flaccid transparent Membrane, which is nothing else but the *Loculi* or *Cellulæ Adiposæ*, in which the *Fat* of Bodies in good Habit is contain'd, but which in these is wasted.

What it is. It is in Substance a gross whitish Oil, and is indeed nothing but the Oily Part of the *Aliment*, separated from the *Arterial Blood* by the *Adipose Glands*, and carry'd by peculiar *Ducts* to the *Membranous Cells*, from whence it is transmitted to the *Blood* again by the *Veins*.

Its Use.

The *Fat* of both Kinds serves as a natural Balsam to preserve the Body, and by mixing with, and enveloping the *Salts*, wherewith the *Blood* and *Serum* are highly saturated, keeps them from fretting and corroding the Parts of the Body, through which they pass. It is thought likewise, not without great Probability, to make a considerable Part of the Nourishment of our Bodies; and accordingly we find that the grossest, fattest Persons, falling into an *Atrophy*, do in Process of Time lose all their *Fat*: Which is always quite expended in such Cases before the Disease becomes fatal.

Incommo-
dities of
too much
Fat.

As it has its great and excellent Uses, so it is not without its Inconveniences likewise. For, corpulent Persons that abound with it, having their *Blood* too much charged, and all their Organs too much clogged with it, *Sensation* is damp'd, and they are apt to fall into a *Drouse Letbargick* Condition, which sometimes ends in sudden Death. But the abundance of it seldom fails of being attended with *Inactivity* and *Somnolency*, not only from the Unwieldiness of an over-

over-grown Body, nor from the stuffing of the Cavities of the *Thorax* and *Abdomen* alone, which is sometimes so great as to obstruct in some Measure the Motion and Expansion of the *Diaphragm* and *Lungs*, and so to produce a *Dyspnœa* or Difficulty of Breathing, and sometimes an *Orthopnœa*, which arises from the Pressure of the over-charged *Viscera* of the *Abdomen* upon the *Diaphragm*: But it is probable likewise that the Quantity of *Fat* or *Oily* Particles being returned into the Blood, and engaging and implicating the more subtle active Parts, hinder those Secretions from being made in the *Brain* in that Quantity, which is necessary to a vigorous Animal Action.

The MEMBRANA ADIPOSA, if there be really any such *Membrane*, and that it be not rather the exterior Membrane of the *Carnosa* or *Musculorum communis*, which most Anatomists now agree it to be, is supposed to be the Basis of the *Fat*, to which the Cells wherein it is contained are fix'd.

Next under the *Fat* lies the PANNICULUS CARNOSUS, which consists of a double Membrane, the upper of which makes the *Membrana Adiposa* before spoken of. The under, which is likewise call'd MEMBRANA MUSCULORUM COMMUNIS or MUSCULOSA, is in some Places interwoven with pretty thick *Muscular* Fibres, which are supposed to contract and corrugate the *Skin*: Tho' this Action of it is visible no where in a human Body, except on the Forehead, or in some the whole Scalp. It is spread all over the Body, but very unequally in point of Thickness, and has its *Arteries*, *Veins*, and *Nerves*, from those of the subjacent Parts.

The particular Use of it is to support, and be, as it were, a Basis to the Globules of *Fat*. It serves in general as all other Membranes do, to

wrap, defend and connect the Parts together. Its different Names taken either from the Structure, or the Site, have occasioned some to multiply it, tho' thro' Mistake only.

C H A P. V.

Of the Muscles of the Abdomen.

NExt after the *Membrana Musculosa* appear the MUSCLES of the *Abdomen*, of which there are Five Pair.

*Obliquus
Descen-
dens.*

Of these the *outermost* are the OBLIQUE DESCENDING Pair, so call'd from the oblique Course of the Fibres, which run, from their Rise above, slanting downwards toward the Fore Part.

This is a very broad Muscle, covering each entirely one Side of the *Abdomen*, and some Part of the *Thorax*. It arises from the two last true Ribs, and five spurious ones, and is indented with the *Serratus Major Anticus* by five or six Digitations, each of which receives a Nerve from the Interstices of the Rib. It springs likewise from the Margin of the *Ilium*; and ends in a broad Tendon in the

*Linea
Alba.*

LINEA ALBA, which is a white Line, that runs from the *Cartilago ensiformis* to the *Os pubis*, dividing the *Abdomen* exactly in the Middle, and is form'd out of the Tendons of the *Oblique* and *Transverse* Muscles.

*Obliquus
Ascen-
dens.*

The next Pair is the OBLIQUE ASCENDENS, which lies under the lower Part of the former, running with a Course just contrary from the lower Part upwards.

Its fleshy Fibres have their Origination from the Edge of the *Os Ilium*, and end at the *Costæ Nothæ*: It terminates with a large double Tendon in the *Linea Alba*, the upper Part of which
ramping

ramping over the *Musculus rectus*, and the other creeping under it, and joining together at the *Linea Alba*, do as it were sheath the *Musculus rectus*. Tho' sometimes towards the bottom of the Muscle this Duplicature is not so visible, but begins about the Navel, and so proceeds upwards.

These Muscles, as likewise the *Transverse*, are perforated in Men near the *Os pubis*, for the Passage of the *Spermatick Vessels*, and in Women for the *Ligamenta Uteri rotunda*. Thro' the lower of these Perforations in a Rupture or Dilatation of the *Peritonæum* part of the Intestines sometimes slip, and make that Tumour which is call'd a *Bubonocoele* or Inguinal Rupture.

The next is the *MUSCULUS RECTUS*, so *Rectus*. call'd, because its Fibres run streight along the Belly, from the *Sternum* and *Cartilages* of the *Ribs* to the *Os pubis*.

The Belly or *Venter* of this Muscle is distinguish'd by three, sometimes four tendinous Lines or Inscriptions, according to the Number of which some have reckon'd it so many several Muscles: Others, as a Muscle of so many Bellies. They have been apt likewise to dispute which was the *Head*, and which the *Tail* of this Muscle, which being a dry Speculation of no great use, I shall not trouble the Reader with any other Decision, than that he may reckon either of them indifferently, *Head* or *Tail*.

After these comes the *PYRAMIDALIS*, which *Pyramidalis*. being but a small Muscle, tho' it lies upon the *lis*. lower part of the *Rectus*, is usually taken notice of after it; because till the *Rectus* is rais'd, it is not so distinctly apparent.

It has its Name from its Figure, and its Origin from the superior and inferior Margin of the *Os pubis*, with a pretty broad fleshy Head, from whence it rises, and grows gradually narrow till

it ends in a small, almost round Tendon, in the *Linea Alba*, sometimes almost at the Navel.

Sometimes
single,
sometimes
wanting.

This is sometimes a single Muscle, and in some Subjects not found at all: But where it is solitary, it is generally found (as some Authors say) on the left Side.

Transverse-
jalis.

The last is the TRANSVERSE, so call'd from the Course of its Fibres broad-ways cross the *Abdomen*. It is the lowest in Situation, and lies immediately upon the *Peritonæum*, which it sticks close to. It arises from the Transverse Processes of the *Vertebræ Lumbares*, from the lower Rib and interior Margin of the *Os Ilium*, and is inserted with a broad Tendon like a Membrane into the *Linea Alba*.

Arteries
and
Veins.

All these Muscles receive Branches of *Arteries* and *Veins* in the upper Part from the *Mammaries*, which exert themselves about the *Cartilago Xiphoides*, and below from the *Epigastricks*, on each Side from the *Intercostals* and *Lumbals*.

Under those Muscles, but more particularly under the *Recti*, run the principal Branches of the *Mammary Arteries* and *Veins*, which latter have been observed to have very numerous Inosculations with the *Epigastrick Veins*, of which *Veerheyen* tells us, that he observed some hundreds in a Dog. Under the *Transverse* and *Oblique* run the *Intercostals* and *Lumbals* in most Plenty, tho' 'tis probable all of them are serv'd by each, unless perhaps the *Pyramidals*.

Nerves.

They have their *Nerves* from the *Intercostals* and *Lumbals*, which usually bear the Blood Vessels Company.

Use.

These Muscles serve not only as a Wall and Defence to the *Viscera*, contain'd in the *Abdomen*; but likewise by their Contraction to streighten the Cavity of the *Abdomen*, and by that means to promote the Descent of their Contents thro' the *Intestines*, and to force it into the *Lacteals*.

teals, and to serve as Antagonists to the *Sphincter*, *Ani* and *Vesicæ*, and forcibly expel the Excrements of those Parts, and likewise of the *Fœtus* in Parturition. They are also instrumental towards *Expiration*, by drawing down the *Ribs*, and upon this account are to be look'd upon as assistant Antagonists to the *Intercostals*, and other Muscles that promote *Inspiration*. They are likewise the chief, if not only, Organs or Instruments of *Vomition*, which Action is vulgarly, tho' falsely, imputed to the Stomach, of which more largely hereafter.

C H A P. VI.

Of the Peritonæum.

THE Muscles of the *Abdomen* remov'd, the *Peritonæum* displays itself, which is *um.*
a thin, soft, smooth Membrane, covering and containing all the Viscera of the lower Belly.

Its Figure in the natural State answers that *Figure.*
 of the lower Belly, and makes a kind of irregular Oval.

It is every where double, but more plainly so *Duplicity.*
 from the *Navel* to the *Os Pubis*: Where likewise in Women it is thicker for the conveniency of Distention in the time of Gestation.

Its *External* Surface is somewhat rough and fibrous from its Connection with the Muscles: But *External Surface.*
 the *Internal* is exactly smooth, and lin'd with an unctuous Humour (to facilitate the sliding of the *Intestines* along it) which is separated by a Number of small Glands, which in Hydropical Bo- *Glands.*
 dies grow larger and more visible, as the Membranes themselves do likewise thicker.

It is connected on the outside to the *Transverse* Muscles of the *Abdomen*, and *Linea Alba*,
below

below to the *Os Pubis* and *Ischium*, on the side to the *Os Ilii*, behind to the *Os Sacrum* and *Vertebræ Lumbares*, especially the first and third. From which it is said by many to have its Origin, and where likewise the Duplicature is again very visible, not only upon the account of its remarkable thickness, but from its spontaneous parting to receive the *Kidnies* betwixt the *Laminae*. It is also reflected from the inferior Surface of the *Diaphragm* to the Superior, or Convex Surface of the *Liver*, which it suspends, and this part of it is called *Ligamentum Suspensorium Hepatis*.

Ligamentum Suspensorium Hepatis.

Processus Externi.

The Exterior Coat has two Processes, in Men falling down into the *Scrotum*, and wrapping up the *Spermatick Vessels*, where they are likewise dilated, and make the *Tunica Vaginalis* of the *Testes*. In Women they form an *Involucrum* for the *Round Ligament* of the Womb. Ignorant Surgeons, not knowing precisely where these Processes pass the Perforations of the *Obliqui Descendentes*, sometimes mistake Ruptures for Tumours of another kind, and attempt Suppurations, that might be fatal, if prosecuted: And sometimes *Vice Versa*, put Trusses upon Apostemations, that ought to be open'd.

Involucrum Ligamentum Rotundi Uteri.

Arteries and Veins.

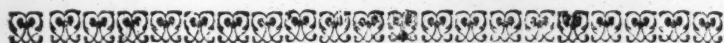
It receives *Arteries* and *Veins* in the upper part from the *Mammariæ* and *Diaphragmaticæ*: In the lower from the *Epigastricæ* and *Sacræ*: And on each side from the *Lumbares*.

Nerves.

The *Nerves* come out of the *Os Sacrum*, and the *Loins*.

Lymphaticks.

Olaus Rudbeck pretends to have discover'd *Lymphaticks* in it, which are seldom mention'd by Authors, because seldom visible, but in Hydropical Cases, and therefore not often seen. In Morbid Cases great quantities of *Serum* have often been found between the Duplicatures of this Membrane, when there has been none beneath it



C H A P. VII.

A View of the Viscera of the Abdomen in their Natural Situation, &c.

THE *Peritonæum* removed gives us the View of the Parts in their Natural Situation, as they lie disposed one among another.

Funiculus Umbilicalis. The first, that appears, is the FUNICULUS UMBILICALIS, of which Care must be taken, that it be not cut in dividing the *Linea Alba*, which it perforates. It consists of three Sorts of Vessels, a *Vein*, two *Arteries*, and the *Urachus*, which soon after the Birth dry up, and become *Ligaments*.

Omentum. The next to be consider'd is the OMENTUM, which is spread almost all over the *Intestines*, and covers the superior Part of the *Abdomen*.

Intestines. The *Omentum* taken away, the INTESTINES are discovered variously contorted, and connected almost thro' their whole length to the *Mesentery*: The *Thick* ones lying uppermost, and the *Thin* underneath, and together filling the greatest Part of the *Umbilical*, and *Hypogastrick Regions*.

Ventriculus or Stomach. In the *Left Hypochondrium* immediately under the *Diaphragm* lies the STOMACH, which if it be empty, and the *Thorax* unopened, is scarce seen, unless it be forcibly elevated, and brought forwards.

Lien Spleen. On the Left Side of the *Stomach* lies the SPLEEN, which, unless bigger than ordinary, is quite hid by the *Stomach* and *Diaphragm*, and impending Parts of the *Thorax*, and therefore must be drawn a little out of its *Natural Site* to be plainly seen, before the *Thorax* is opened.

The

The LIVER is a very bulky *Viscus*: But, because the *Diaphragm* in dead Bodies is very much Concave towards the *Abdomen*, even this too is almost hid by the *Diaphragm* and *Cartilages* of the *spurious Ribs*: So that it is hard to shew its Posture likewise, till the *Thorax* be opened. Therefore to display the contain'd Parts of this Region, either the *Thorax* with the *Diaphragm* must be forcibly lifted up, or the *Lungs* so strongly inflated that the *Stomach* and *Liver* may be driven downwards. By the first way you see them as in violent *Expiration*; and by the latter as in the Act of ordinary *Inspiration*.

The KIDNIES and VESICA URINARIA require somewhat more Help to make them discover themselves. On each Side in the *Loins* lie the *Kidnies*, entirely hid, and cover'd by the ambient Parts, which must be removed by the Hand before they can be come at.

Lower yet in the *Pelvis* of the *Abdomen*, partly under the *Os Pubis* lies the BLADDER of URINE, which likewise needs some Help, though not so much as the *Kidnies*, to have a Sight of it.

The confused Order, wherein divers of these Parts seemingly lie perplexed and intermixed with one another, has occasioned many Mistakes concerning the Seat of Internal Abdominal Pains, in some of which a great deal of Judgment is required to distinguish nicely: As between *Hypochondriacal*, *Colical*, *Nephritical* and *Lumbal Pains*. So likewise *Inflations* of the *Intestines*, particularly of the *Colon*, often impose upon Physicians for indurated *Spleens* and *Scirrhus Livers*, only by seeming to point by some extraordinary *Intumescence* and *Hardness* at the Regions where those *Viscera* lie.

TAB.

T A B. I.

F I G. I.

Part of the *Cuticula* raised from the *true Skin*, as it appears by a magnifying Glass after it has lain ten Days in common Water.

A, The *Inferior* or *Internal* Surface of the *Cuticula* next the *Cutis*.

B, The *exterior* Surface of the *Cutis* next the *Cuticula*.

a a, The *Hairs*, which are

common to the whole Body, and were raised with the *Cuticula*.

b b, Their *Bulbous* Roots, as they appear'd when drawn out of the *Foramina*, that received them in the *Cutis*.

c c, The *Foramina*, or Holes of the *Skin*, whence the Roots of the Hairs were extracted.

F I G. II.

The *Abdomen* open'd to shew its *Viscera* in their Natural Situation. In this Subject the *Skin* and *Fat* were taken off the upper Part of the Body and Arms, to shew their external Muscles: The Right Arm lying in that Action call'd *Pronation*; the Left in *Supination*.

A A, The *Internal* Surface of the *Skin* covered with the *Fat*.

B B, the *Internal* Surface of the *Peritoneum*, as it appears when the Muscles with it are divided cross-ways at the Navel, and their four Corners turn'd out to shew the Parts contain'd.

a, The Navel cut out, and left to shew the *Ligaments* in Adults call'd.

b, The *Urachus*.

c c, The two *Umbilical Arteries* turn'd down.

C, The *Vena Umbilicalis* also chang'd to a *Ligament*,

here turn'd up, where Part of the *Ligamentum suspensorium Hepatis* may be also seen ψ.

D, Part of the *Convex* Surface of the *Liver in situ*.

E, Part of the *Stomach* also seen in this Position.

F F F, The *Omentum* as it usually appears lying on the Guts. Here its Blood Vessels may be seen that pass from the Stomach to it, call'd the *Arteria* and *Vena Gastrica Epiploica dextra* and *sinistra*.

G, Some of the *small Guts* not cover'd by the *Omentum*, as they lie on the Beginning of the *Colon* in the right *Ilium*.

d, Part of the *Musculus Cremaster*, as it descends on the Process of the *Peritoneum*, that incloses the *Spermatick* Vessels in their Progress to the *Testes*.

e, The

e, The Bladder of Urine, distended with Wind to make it appear in this Position.

f, *Os Pubis.*

g, The *Ensi form Cartilage.*

HH, The two *Pectoral Muscles in situ.*

h, *Os Pectoris* or *Sternum.*

I, *Musculus Quadratus Colli* or *Platysma Myoides* covering.

i, The *Massiceas,*

k, The *Masseter,* and

l, The *Parotid Gland.*

K, Part of the *Clavicula.*

p, Part of the *Musculus Elevator Scapulae,* and

q, A portion of the *Cucullaris,* covered by the *Quadratus Colli,* also

m, The *Musculus Zygomatikus,* and

n, The *Temporalis.*

o, *Os Jugale,* and *Musculus Orbicularis Palpebrarum.*

L, *Musculus Deltoides.*

M, *Gemellus.*

N, *Brachieus internus,*

OO, Parts of the *Serratus Major Anticus,* by which may be seen (in the Shade) a

portion of the *Latissimus Dorsi.*

P, The *Biceps* in both Arms.

Q Q, *Radialis extensor Carpi.*

R, *Supinator Radii Longus* in both Arms.

S, The *Extenders* of the Thumb.

T, *Extensor Digitorum Communis.*

V, *Extensor Minimi Digiti.*

W, *Anconaeus.*

X, *Ulnaris Extensor.*

Y, Part of the *Ulnaris Flexor Carpi.*

Z, *Abductor Minimi Digiti.*

r, The *Interossei,* as they appear on the Back of the Hand.

s, The *Flexor Carpi Radialis* in the Left Arm.

t, Part of the Tendon of the *Palmaris longus.*

u, *Abductor Pollicis.*

w, The Tendon of the *Flexor Pollicis longus.*

x, The Tendons of the *Musculi Flexores Digitorum Perforans* and *Perforatus.*

CHAP. VIII.

Of the Omentum, or Caul.

THE OMENTUM, EPIPLOON, Rete or Re-Omenticulum (for by all these Names it is variously call'd by Authors) is a membranous thin Part, connected at its upper Extremity chiefly to the bottom of the *Stomach,* to the concave part of the *Liver,* to the backside of the *Duodenum,* to that part of the *Colon,* that lies under the

the *Stomach*, to the *Back*, and to the *Spleen*. It is spread immediately over the *Intestines*, having its other *Extremity* loose.

Duplica-
ture, or
Leaves.
*Vasa Adi-
posa.*

Areolæ.

Cavity.

It consists of *Two* Membranes or Leaves betwixt, and on the Surface of which innumerable *Veins*, *Arteries*, *Nerves*, and *VASA ADIPOSA*, or *Fat Vessels*, running variously cross, and intersecting one another, divide it into a Multitude of little *AREOLÆ*, resembling the *Masles* of a fine *Net*. The *Fat* in its proper *Ducts* running along with the other *Vessels*, and together with them, renders those *Divisions* of the *Areolæ* obscure, while the intermediate *Spaces* are filled with a transparent Membrane, full of small *Holes*, so that the whole in shew seems to be a beautiful kind of *Net*.

These *Leaves* form a considerable *Cavity* like a large *Purse* or *Sachel*, into which, if a *Blow-pipe* be thrust below the *Stomach*, it may be blown up to the *Capacity* of a *Gallon*. Its *Bottom* is fasten'd to the small *Guts*. Tho' these *Membranes* be of a *Texture* too rare to retain the *Flatus* long, yet the *Experiment* suffices to shew the *Continuation* of the *Trunks* of the *Blood Vessels* from the *Stomach*, *Duodenum*, *Colon*, and *Vas Breve* into it. Some have made this *Sacculus* the *Seat* of divers *Distempers*, but I think without sufficient *Ground*, except in *Dropsies*, and therefore shall not take *Notice* of them here.

In several *Subjects* it is of an *unequal Extent*, in some not reaching beyond the *Navel*, in others being large enough upon a *Rupture* of the *Peritonæum* to fall down into the *Scrotum*. *Hippocrates* lays it down as one of the *Occasions* of *Sterility* in *Women*, when being too fat, it lies too heavy upon, and compresses the *Os Uteri*. Perhaps this *Conjecture* of his is founded upon his *Observation*, that *Barren Women* are apt to grow

grow *Fat*, and that those which are *Prolifick*, usually grow *Fat* when they have done Bearing, and so may ascribe their ceasing to Bear, to their growing *Fat*; whereas I should rather impute their growing *Fat*, to their *ceasing* to Bear.

The ordinary *Weight* of it is about half a *Weight*. Pound; tho' sometimes it has been observed very thick and hard, and in *Hydropical* People to amount to several Pounds *Weight*.

Its *Arteries* come from the *Cæliac* and *Mesenteric*, and the *Veins* run to the *Porta*, especially the *Splenic* Branch of it, and are call'd *Epiploicæ*, and some, which are common to the *Stomach* as well as the *Omentum*, are call'd *Gastro-epiploicæ*. Its *Nerves* come from the *Intercostals*, and are not large.

The *Fat* here, as in the *Membrana Adiposa*, is either separated into the *LOCULI* or *ADIPOSE CELLS*, and from thence deliver'd into the *Ductus Adiposi*: Or else is brought by them to these *Adipose Cells*. For the extreme *Fineness* and *Transparency* of these *Vessels*, as well as of their *Liquor*, renders it exceeding difficult to trace their *Origin* or *Course*: And indeed it remains something doubtful, whether they be hollow and real *Ducts* or not, or whether they be only *Fibres*, such as are observed in the *Spleen*, along which the liquid *Fat* does as it were drill its *Way*, as the easiest it can find.

The accurate *Malpighius*, the first nice Observer of this Part, and Discoverer of these *Ducts*, (if such they are) inclines to the former Opinion: And indeed it is hard to entertain any other. All that is certain concerning them, is, that they discharge themselves, or terminate in little oily Globules of *Fat*; concerning the farther Use and Progress of which, much remains still to be discovered.

Other
Doubts of
Malpi-
ghius.

Concern-
ing their
Origin.

Concern-
ing their
Propaga-
tion thro'
the Body.

Concern-
ing the
Source of
their Fat.

Deserving
a farther
Enquiry.

MALPIGHIOUS himself starts several ingenious Doubts, which he recommends to farther Prosecution: *First*, Whether these *Adipose Ducts* be not propagated from the Fibres which abound in the *Spleen*, or those Fibres from them: One of which he is induced to suspect from the Similitude of these Fibres to those which he finds in the *Omentum*, and from the Communication and Continuation of some Fibres, which he observes between them, whereas those of the *Spleen* seem to have none with the *Blood Vessels*.

His other Doubt is, whether there may not yet be any undiscover'd Communication between the *Omentum* and the *Membrana Adiposa*: And whether by means of its Connexion with the Back, its Vessels may not be propagated into every Region of the Body by the Mediation of this Membrane, which is spread over it, and so be as it were the common Root of the Fat all over the Body.

Neither is he more certain yet, whence this *Omentum* is supply'd; for besides the *Spleen* before mentioned, *Malpighius* offers to our Consideration two other Fountains, viz. the *Stomach*, and the *Glands* of the Body. The first he suspects upon the account of the Connexion of the *Omentum* with it, and the latter upon Observation, that they are generally accompany'd with Fat, and from the Taste of them, which he thinks they are beholden to the Fat for.

But, as he does, so do I think this Matter deserves a farther Enquiry; for I cannot think any of those the real Source of it, and must content my self with deriving it from the Blood in general, without assigning the immediate Organs of its Separation.

As *Anatomists* are hitherto deficient in assigning the true Source of the Fat, so are they likewise in my Opinion about the Uses of it.

The

The first and principal Use of the *Fat* in general is to implicate and curb the Acrimony of the Salts of the Blood, which otherwise would be apt to fret and corrode the Parts thro' which it passes, especially those which are Membranous and Vesicular, and accordingly in *Lean* Persons we observe, that they are more liable to *Catarrhs*, and other Distempers arising from Acrimonious Serum. It serves likewise to Anoint and Lubricate the several Parts, and to make them move commodiously; and is likewise suspected by many to serve as Nutriment to the Body, which Opinion is supported by the common Observation, that *Fat* Persons grow *Lean* by long Abstinence, and that some Animals, which in the Summer-Season feed plentifully, and grow *Fat*, will at the Approach of Winter withdraw and hide themselves, and live all that Season without Food, and appear again in the warm Weather *Lean* and shrunk; which is an Argument that the *Fat*, which they gather in the Summer-Season, serves them for Nutriment in the Winter. This Opinion is countenanced by other Observations, that most of those Animals retire very *Fat*, especially the *Tortoise*, which has peculiar Vessels containing an extraordinary Stock of *Fat* along the *Intestines*, which probably serves for his Winter's Sustainance. This Use supposes a Return of it into the Blood, which is very probable, tho' the particular Way of its Passage is not yet discovered.

Uses of the
Fat.

Retarding
the Acri-
mony of
the Salts.

Suppling
and Lu-
brication.

Nourish-
ment.

I am of Opinion likewise, that it serves as a sort of a *Natural Balsam* to preserve the other Parts from Corruption. For as all *Oily Bodies* are more particularly exempted from Putrefaction than others, so in an Animal Body all the other Parts are subject to speedy Putrefaction, the *Fat* only well separated from the rest, will keep without putrefying. It may perhaps be objected, that after Death corpulent Bodies purge most,

Serves as
a Natural
Balsam
to preserve
the Body.

and putrefy soonest: But that does not arise from the Quantity of *Fat*, but from the abundance of mixt Humours, which are apt to ferment and putrefy, and of which emaciated Bodies are almost destitute, and therefore not liable so soon to putrefy.

Use of the
Omentum.

The particular Use of the *Omentum*, with regard to its Situation, is to assist the *Peristaltick* Motion of the *Intestines* by lubricating them with its *Oily* Substance, which transudes thro' its Pores, and by following them in their Doublings and Windings, and thereby serving them as a soft Bolster to slide upon, and, by their filling up the Hollows, preventing their being too much distended with *Flatulencies*, yet giving Way to 'em when repleted with Aliment. It may have some farther Effect by cherishing the *Intestines* with its Warmth; but that, tho' it has been fancy'd to be its primary Use, cannot be much, because it is not naturally warmer than the *Intestines* themselves, and their Comfort of that Kind must be mutual.

C H A P. IX.

Of the Oesophagus.

Why
treated of
here.

THO' the OESOPHAGUS properly belongs to another *Venter* of the Body, yet being the Channel thro' which every thing we take is convey'd to the Stomach, and being of a Substance so nearly resembling it, that they seem to be but a Continuation or Expansion of each other: I thought fit to premit the Account of it to that of the *Stomach*, that the Action of the latter might be consider'd entire.

Oesophagus.

The OESOPHAGUS, GULA, or GULLET, is a Membranous Pipe descending from the Mouth to the

the STOMACH, between the *Aspera Arteria* and the *Vertebrae* of the Neck and Back in a streight Line, except a little Deflexion about the fifth *Vertebra* of the *Thorax*, where it turns somewhat towards the Right, to make way for the great *Artery*, which runs along with it to the ninth, where turning again towards the last, it crosses over the *Artery*, and piercing the *Diaphragm*, ends at the Left Orifice of the *Stomach*.

It consists of several *Coats* or *Membranes*, ^{its Coats.} which are vulgarly reckon'd by *Anatomists* to be but three: Tho' some number four, and others five or six, allowing the *Crusta Villosa* to be one, which last Divition, as the most nice, we shall follow. The first is membranous, and design'd only for a Covering to the rest, like the *Membrana Musculorum Propria*, which it resembles, and seems only a Continuation of the outward ^{Membrana.} *Membrane* of the *Stomach* deriv'd from the *Péritonæum*: Tho' some *Anatomists* derive this of the *Oesophagus* from the *Pleura*, others from the *Diaphragm*, &c. a Controversy of no great Importance, and scarce worth the Decision.

The second Coat is MUSCULAR, consisting ^{Tunica} of strong fleshy Fibres, like other Muscles, so ^{Musculosa, seu} that it seems to make the *Gula* a hollow fistulous Muscle. According to *Steno* and *Willis* it ^{Musculus vaginalis.} consists of two Orders of Fibres, going from Top to Bottom in *Spiral Lines*, contrary to, and decussating each other.

This Description is very exact of the *Gullet* of *Ruminants*, but not so of that of Men: And it is probable, those two great Men before-mentioned fell into this Error by examining the *Oesophagus* of Brutes only, and thence concluding too hastily that the Structure was the same in *Humane*.

In Men this Coat consists of two fleshy *La-Fibrae melle*, like two distinct Muscles. The outward ^{recta.} being

being composed of STREIGHT LONGITUDINAL FIBRES, which in the Descent of the *Oesophagus* growing narrower, (not far from the *Pharynx*) approach one another nearer, and are implanted into the Parts underneath.

*Annular-
res.*

The *Inner Order of Fibres* is ANNULAR without any observable Angles, tho' it is easy by drawing it either upwards or downwards to make them appear Angular, with the Angles pointed towards the Force, which may have imposed upon some; but when under no Violence they appear perfectly round.

*Their
Action.*

The Use of this Coat and these Orders of Fibres is to promote *Deglutition*, of which the *Longitudinal*, when in Contraction, shorten the *Oesophagus*, and so make its Capacity larger to admit of the Matter to be swallow'd. The *Annular*, on the contrary, in their Action, contract the Capacity, and closing behind the descending Aliment, press it downwards. So that these two Orders of Fibres seem to be Antagonist Muscles to one another, yet by different Actions both conspire to the same End, the *Pre-trusion* of the *Aliment*.

Illustration

*Tumours.
of the
Gula.*

This Action of these Fibres is farther evinced and illustrated by those *Oedematous* or *Schirrous* Tumours, which sometimes happen on this Part, which render *Deglutition* difficult, especially of *Fluids*. For *Solids*, being capable of the Impression of these Fibres, and the assistant Muscles, are, tho' with Difficulty, forced thro' the obstructed Part in Bulk and Quantity as they descend thither: But Fluids, not having Resistance enough to force the Tumour, are apt upon Compression to return upon the *Fauces*, and cannot pass but in a *Fillet* or *Thread* answerable to the Space left open by the Tumour, and therefore are a long Time in passing.

On the contrary in a *Paralysis*, when the *Paralysis*.
Tone of the Fibres is resolved, yet the Bore
of the Gullet not obstructed, Fluids pass with
equal Ease, as if the Part were not disaffected.
But Solids, wanting the Force of the Muscles
and Fibres, cannot be got down.

The next Coat, which is called the VASCU-^{Tunica}
LAR, consists of a double Membrane. The ^{Vasculosa.}
outward form'd of irregular Fibres, and innu-
merable Vessels, interwoven, from whence it is
called the *Vascular*.

The INNER TUNIC consists of streight ^{Glandulo-}
Longitudinal Fibres somewhat fleshy, mixt^{sa.}
with abundance of little Glands, from whence
it has been esteem'd a distinct Coat, and is cal-
led the *Glandulous*. This Membrane adheres
firmly to that within it, which is call'd

The NERVOUS Coat, and is extremely fine, ^{Nervea.}
made up of excessive slender Fibres variously
disposed. This Coat is continued to that which
covers the *Fauces*, *Mouth* and *Lips*, whence it
comes, that tickling the Bottom of the *Fauces*
by vellicating this Membrane, provokes a Reach-
ing to Vomit. This Membrane is the Instru-
ment of Sensation, in this Part, and as some think
the Seat of *Thirst*, or the Organ whereby the
Appetite of *Drink* is produced.

This Coat is lined inwardly with a villous ^{Villosa.}
Crust which is not reckon'd among the *Tunics*,
which I look upon to be the Excretory Ducts of
the Glands, and, not unlike the *Cuticula* to the *Cu-*
tis, to serve to defend the subjacent Membrane.

In case of Excoriations by sharp Humours it ^{Rejected}
has sometimes been brought up at the Mouth, ^{sometimes}
when the upper Orifice of the Stomach has been ^{by the}
closed by Tumours, which Case seems to differ ^{Mouth.}
only in the Circumstances of the Part affected,
and the Way of Evacuation from the like Ex-
cretions in *Dysenteries*.

This Membrane so cast up, does not ill resemble the *Cuticula*, as it appears when raised by Vefication; and perhaps there is as near a Refemblance between the Nature of their Causes as to the Kind and Degree of Acrimony, both proceeding from Volatile Animal Salts, tho' one be External and Artificially procured, the other Internal and Spontaneous, or Fortuitous.

Pharynx.

The upper Opening of the *Oesophagus* situated at the Bottom of the *Fauces* is call'd PHARYNX This being the Place where the Action of Deglutition commences, and where it is mainly performed, it is assisted by or rather composed of three Pair of Muscles.

Par Stylopharyngeum.

The first which is call'd STYLOPHARYNGÆUM arises round and fleshy from the *Processus Styloides*, and in its oblique Descent becomes thicker, and afterwards is expanded on the back Parts of the *Fauces*, between the double Series of Fibres of the following Muscles.

These, when they act, draw up and dilate the *Pharynx*.

Par Pterygopharyngeum.

The PTERYGOPHARYNGÆUM arises from the *Processus Pterygoides*, where the Tendon of the *Musculus Pterygostaphilinus* is reflected. Some fleshy Fibres of it spring likewise from the upper Jaw-Bone behind the farthest Grinder, and some from the Sides of the Tongue, and *Os Hyoides*. From all these Places its fleshy Fibres pass semicircularly, and meet with those of the opposite Side in a middle Line on the back Part of the *Pharynx* externally. In the Internal Surface of the *Fauces* is another Order of fleshy Fibres that decussate the former at acute Angles. These rise not only from the Sides of the *Uvula*, but also from the Root of the Cartilage excavated for the *Meatus à palato ad aurem*, and descend obliquely, to their Insertions in the Glandulous Membrane of the *Pharynx*, as far as the *Cartilago Thyroides*. This

This Muscle serves not only to constrict the *Uſe*.
Pharynx, but likewise to compress the *Tonsils* and
 force out their *Mucus*, upon which score it is like-
 wise employ'd in promoting *Hawking*.

Valsalva, who has lately given us a new Ac-^{These}
 count of the Muscles of these Parts, denies the ^{multiplied}
 Existence of this part of this Muscle, which ^{by Valsal-}
 springs from the *Processus Pterygoides*, which, ^{va.}
 however, is constantly and regularly found. The
 same Author has likewise of two other parts of
 this Muscle, long since describ'd and figur'd by
 Mr. *Cowper*, made two distinct Muscles, and gi-
 ven them two new Names. The part springing
 from the Tongue he calls *Glossopharyngæus*, and
 the other part immediately below it *Hyopharyn-*
gæus.

The various *Originations* of the several Parts ^{And by}
 of this Muscle have caus'd it to be generally di- ^{many o-}
 vided into several Muscles; whence come the *Ce-* ^{thers be-}
phalopharyngæus and *Sphænoparyngæus*, which, as ^{fore him}
 those of *Valsalva* before-mention'd, are only ^{upon the}
 parts of various *Origination*, which concur in ^{Score of}
 forming this Muscle. ^{their va-}
^{rious Ori-}
^{gination.}

The OESOPHAGÆUS, which is generally ac-^{Cephalo-}
 counted a *circular* Muscle, is strictly no more ^{pharyn-}
 than a Production of the foregoing Muscle, whose ^{gæus.}
 Fibres surrounding the *Pharynx*, from a *Tendi-* ^{Sphæno-}
nous Line on the back part of it, but it being ^{pharyn-}
 connected on each side to the *Cartilago Thyroides*, ^{gæus.}
 has been thought to arise from thence, and is by ^{Oesopha-}
Veerbeyen taken for a pair of Muscles conspiring ^{gæus seu}
 to form a sort of *Sphincter* by their Concurrence. ^{Sphincter}
 But in these things *Anatomists* are so little agreed, ^{Gulæ.}
 and they are differences of so small Importance,
 that it is not worth detaining the Reader to re-
 concile them.

It closes the *Gula*, and helps to thrust down *Uſe*.
 the Aliment when enter'd. In which Action it
 is assisted by the *Musculous Coat* of the *Gula*,
 which

Vaginalis
Gulæ.

which is by some reckon'd among the proper Muscles, and call'd *Musculus Vaginalis Gulæ*; but is already describ'd here among the Coats.

C H A P. X.

Of the Stomach.

Stomach.

Situation.

Tabl. I.

Fig. II.

Figure.

Cardia.

Pylorus.

Circular
Fibres, or
Sphincter
of the Py-
lorus.

Antrum
Pylori.

TO the end of the *Oesophagus* is fasten'd the **STOMACH**, which lies immediately under the *Diaphragm*; and is partly cover'd on the right side by the *Liver*; having on its left the *Spleen*. It is in Figure somewhat like a Bagpipe, and has two Orifices. The Left or Superior appended to the *Oesophagus*, seems in reality to be no more than a Continuation or Expansion of it: It is in Greek call'd *καρδία*; The Right or Inferior Orifice is continued to the *Duodenum*, and is called *πυλωρός*. This Orifice is narrower than the other, and extended to the *Duodenum* by an oblique Ascent; which Structure, (quite contrary to the other which enters the *Stomach* almost perpendicularly with a greater Capacity, that the Aliment may come easily in) is given to it to hinder the Aliment from passing too precipitately out of the *Stomach*, before it be sufficiently dissolved. For this reason likewise it is furnish'd with an extraordinary Series of Fibres, which constrict and contract it more than any other part of the *Stomach*; and running round it, serve as a kind of *Sphincter*, which is open'd by the Contraction of the *Stomach*, and by the appulse of the Chyle.

At the bottom of the *Pylorus* is a large Cavity, which *Willis* calls the *Antrum*, and assigns to it the Office of keeping the first digested Chyle, till that which was later taken into the *Stomach* be digested. But if it be true, as *Dr. Wharton* observes,

observes, that there are *Venæ Lactææ* in the bottom of the *Stomach*, such a Provision seems unnecessary, and the most fluid part of the *Chyle* has then another Passage; but the Existence of these is disputed.

The *Stomach* is largest on the left side, and grows straiter and straiter, as it proceeds towards the *Pylorus*.

Its *Magnitude* is various, and less generally in *Magni-* Women than in Men; though in these likewise *tude.* it varies very much, and is largest in those that are accusom'd to eat and drink liberally.

The *Coats* of the *Stomach* are generally recko- *Coats.* ned but three; the inner of which is cover'd with a Mucous Spongy Lining like very fine Hair, as in the *Oesophagus*, call'd the *Crusta Villosa*, and is, in my Opinion, as that is, nothing but the *Excretory Ducts* of the *Glands*.

The *Exterior* is that common one which is *Exterior* deriv'd from the *Peritonæum*. This Coat is eve- *Coat or* ry where very thin about the Orifices, and at *Mem-* the bottom it is much thicker, and furnish'd *brane.* with Fibres somewhat like *Muscular*, and as if they serv'd for Motion.

The *Second or MUSCULAR Coat* consists of *Second or* thick fleshy Fibres, of two Orders *Inward* and *Muscular* *Outward*, and are so dispos'd as to intersect each *Coats.* other on all parts of the *Stomach* at right *Two Or-* *ders of* angles. The *Inward* run obliquely towards the left *Fibres.* upon the upper part of the *Ventricle*; but on the under part they reflect towards the right.

In this outward Order or *Lamina* upon the up- *Fasciculus* per part of the *Stomach*, is a remarkable Parcel, *of Longitudinal Fi-* or *Fasciculus*, of Fibres, which pass from the left *bres.* Orifice *Longitudinally*, and terminate in the right, entering the *Antrum* of the *Pylorus*.

The Office of this Coat is to constringe the *Use of this* *Stomach*, and drive its Contents towards the *Coat.* *Pylorus*, as likewise by the joint Action of its *Fibres*

Peristaltick Motion.

Fibres of both Orders, to make the **PERISTALTICK** or *Vermicular Motion*, which begins at the left Orifice of the Stomach, and is continued thro' the whole Tract of the Intestines, as may be seen in all live Dissections. In this Motion the *Longitudinal* Fibres seem to have the least share; and rather serve as Antagonists to the rest: In their Contraction by approximating the two Orifices of the *Stomach*, they hinder the too hasty Expulsion of the Contents.

Use of the Longitudinal Fibres.

Nervous Coat.

The *Third Coat* is **NERVOUS**, and consists of Fibres variously interwoven with numerous Blood-Vessels and Glands.

Its Use.

This Tunic serves for *Sense*, and by the Pricking of some Humours upon this Coat, *Appetite*, or the *Sense* of *Hunger*, is suppos'd by most Authors to be rais'd; the Ground of which Opinion shall be examin'd hereafter. Its Glands likewise may contribute something towards that Quantity of Mucous Humour, which is found in the *Stomach*.

Crusta Villosa.

The **CRUSTA VILLOSA** is by some Authors reckon'd a fourth *Tunic*, and perhaps not unjustly. On the Inner Surface of this, are to be seen innumerable *Villi* or fine *Fibrillæ*, rising perpendicularly every where out of it, which some will have to serve for nothing but a Defensative to the *Stomach*, to preserve it from acrimonious Humours. But I think them to be the *Excretory Ducts* to the subjacent *Glands*, which many Authors would have to be (that now exploded thing call'd) a *Parenchyma*, but which are indeed the Organs, by which most of that Humour, which is discharg'd upon the Stomach, is separated, and these *Villi* the immediate Channels thro' which it is convey'd.

Its Use.

Inner Surface, or Plicæ of the Stomach.

The Inner Surface of the Stomach, when it is not distended by the Contents, is full of *Wrinkles* and *Folds*, made by the *Nervous Coat* and *Crusta*

Cruſta Villoſa, which, being co-extended to the *Muſcular Coat* in its utmoſt Diſtention, and not Contractile, as that is, muſt, when that is in its Contraction, lye thus folded and wrinkled. But *Hard* in hard Drinkers, and in Stomachs uſually diſtended with Flatulencies, the Tone of the *Muſcular Coat* being deſtroi'd, the Inner ones lie plain, and even with it. *drinking or Flatulencies deſtroy the Tone.*

By the means of theſe *PLICÆ*, the *Nervous Coat*, which is not contractile, but yet extremely ſenſible, is preſerv'd from being painfully ſtretch'd, when the *Stomach* is diſtended: Some will likewise have them to ſerve to be a ſtop or check to the ſliding of the *Aliments* too ſoon out of the *Stomach*; but this ſeems not a genuine uſe of it, becauſe when the *Stomach* is at its full Diſtention, which ſhould be the neceſſary time of checking, the Surface is then more plain, and when the *Stomach* is quite empty, and there can be none of that uſe, the *Corrugations* are then greateſt. *Uſe of the Plicæ. Not to ſtop the haſty Courſe of the Aliment.*

Dr. Gliffon and *Willis*, and after them moſt *Anatomiſts*, have thought, they ſerv'd likewise, and that principally too, to ſtop and keep a reſerve, a ſtock of old *Chyle*, which they thought by the ſtay in the *Stomach*, to be exalted into a kind of *Ferment*, which ſerv'd not only to ſtimulate the *Coats* of the *Stomach*, and to excite Appetite, but alſo as a *Menſtruum* to ferment and diſſolve the future Aliment. To this Opinion I have ſpoken more largely in a diſtinct Treatiſe, and therefore ſhall diſmiſs it in this place. *Nor to keep a Reſerve of Stale Chyle for a Ferment.*

The *Veſſels* of the *Stomach* are very numerous. Its *Arteries* come from the Branches of the *Cæliack* both Right and Left, and are call'd the *Gaſtricks*. Its *Veins* go to the *Porta*, ſome immediately into the *Trunk*, and ſome into the *Splenick Branch*. The firſt are call'd the *Right*

Coronary
Vein.

Vas Breve.

Nerves.

Right Gastricks, and the other the *Left*. To these comes another large *Vein*, which runs along the whole length, and with its *Roots* embraces almost the whole *Ventricle* whence it springs, and is therefore call'd the *Coronary*. It sends off likewise some *Branches* which joyn with the *Splenick Branch* at the *Spleen*, which are by *Anatomists* call'd the *Vas Breve*; but should more properly be call'd *Vasa Brevia*, because of their number. Through those *Vessels* the *Ancients* thought that a *Melancholick Humour* was convey'd from the *Spleen* to the *Stomach*, which serv'd to vellicate the *Membranes* of it, and to excite *Appetite*. But this *Fancy* is refuted by the discovery of the *Circulation* of the *Blood*, which has demonstrated that nothing comes through those *Vessels* from the *Spleen* to the *Stomach*; but that on the contrary, *Blood* is convey'd from the *Stomach* into the *Splenick Vein*, and by that to the *Vena Porta*.

Its *NERVES* are considerable both for *Number* and *Magnitude*, and come from the *Trunks* of the *Par Vagum*, which, descending along the *Oesophagus*, are divided into two *Branches*, *Interior* and *Exterior*, of which the *Interior* joining again together from one *Trunk*, which falls down along the *Oesophagus*, to the outside of the left *Orifice* of the *Stomach*, and from thence spreads itself all over the bottom of the *Stomach*. The *Exterior Branches* likewise joining a little lower, descend to the inner side of the same *Orifice*, and from thence diffuse themselves over all the upper part of the *Stomach*. It receives likewise some *Branches* from the *Plexus* form'd in the *Abdomen* near the *Stomach*, by the *Branches* of the same *Nerve*, which is call'd the *Plexus Cardiacus*.

The

The External Surface of it is plentifully cover'd with *Lymphaticks*, which discharge themselves into the *Receptacle of Chyle*. *Lymphaticks.*

C H A P. XI.

Of the Intestines.

THE INTESTINES, which seem to be nothing but a Continuation of the *Stomach*, consisting of the same Number of Coats, fabricated in the same manner, are protended with various Circumvolutions and Inflexions to the *Anus*, thro' which they discharge the excrementitious part of their Contents out of the Body. *Intestines.* *Coats.*

They are, when separated from the *Mesenteric Connexion*, to which they are all along connected, of a very great length, ordinarily about six times as long as the Persons whose they were. And tho' they seem to be but one continu'd Channel or *Fistula*: Yet because in several Parts their Magnitude, Figure, and Thickness are different; they are in general divided into the *Thick* and *Thin*: And these again are each of them subdivided into three; the three *Thin* are call'd *Duodenum*, *Jejunum* and *Ileum*: And the *Thick*, *Cæcum*, *Colon*, and *Rectum*. *Division into Tenuia and Crassa.* *Number.*

They have all of them in common a kind of *Peristaltic Vermicular Motion*, which, beginning at the *Stomach*, is propagated downwards, and is call'd the *Peristaltic Motion*. To facilitate that, they are generally lubricated with a great deal of *Fat*, especially the *Thick Ones*, whose Surface being somewhat more uneven, and the Contents less fluid than those of the *Thin*, they need somewhat more to make them slide easy.

The first of the *Thin Guts* is call'd *DUODENUM*, and reaches from the right Orifice of the *Stomach*, *Duode-*

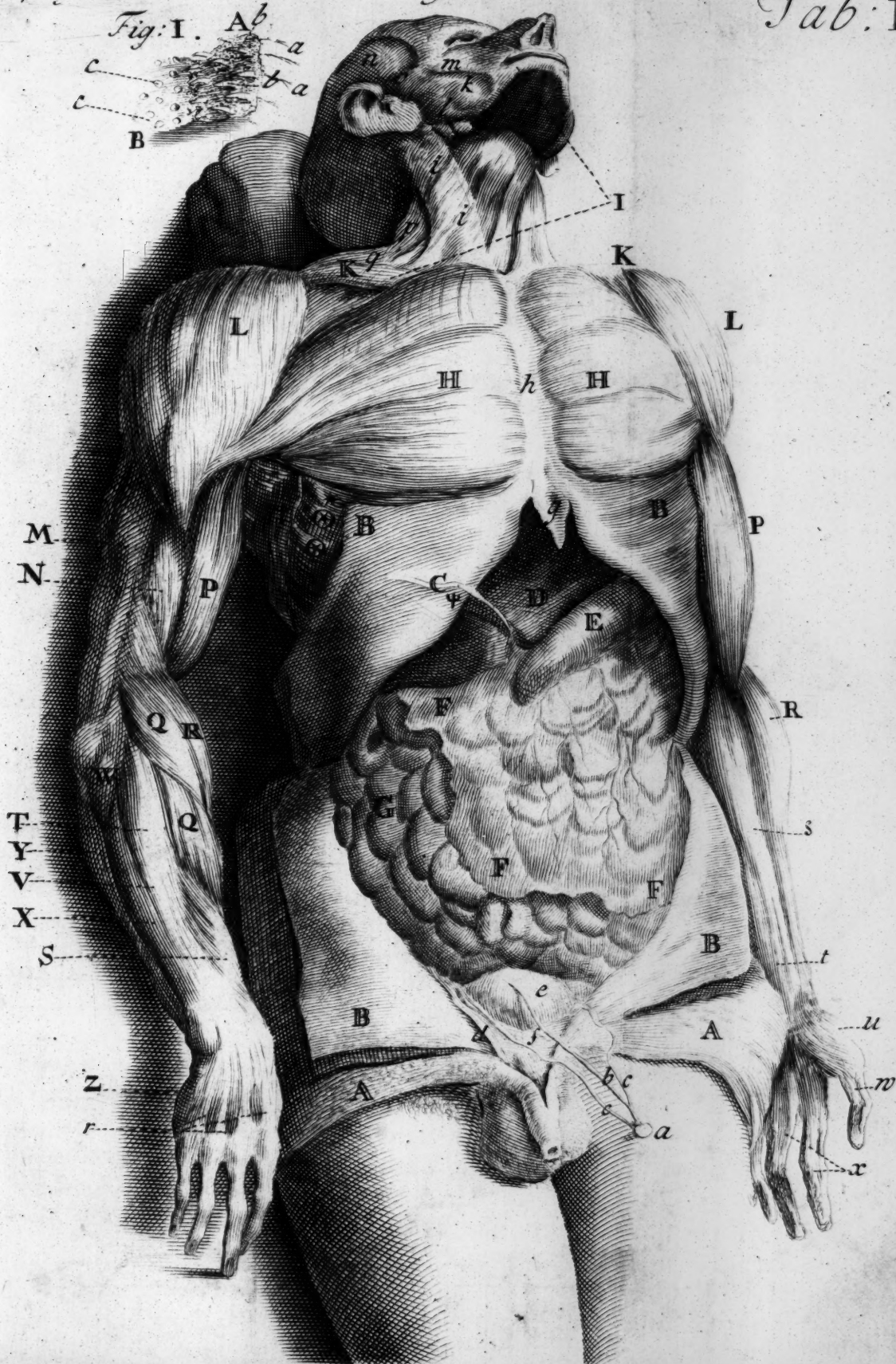
Stomach, as far as the *Vertebræ* of the Back on the left Side, where, at the first Angle made by *Its Length.* the *Intestines*, it ends, which is about twelve Inches: From which Measure it seems to have taken its Name. This Measure however is very far from being very exact, as being much too largely computed.

Orifices of the Ductus Communis, and Pancreaticus. Jejunum. Into this Gut, the *Gall Duct*, and *Pancreatick Duct* empty themselves; and their several Liquors mix with the *Chyle*.

The next Intestine is the JEJUNUM, so call'd because it is generally found more empty than the rest; which may be occasion'd partly by the Fluidity of the *Chyle*, which is greater in this Intestine, than in any of those that follow it. And partly by its Capacity, being somewhat larger than that of the *Duodenum*, and therefore it gives a freer Passage, and perhaps also the Irritation of this Gut thro' the Acrimony of the *Bile*, which is discharg'd upon the *Intestines* a little before the beginning of this Gut, may contribute something towards accelerating the Passage of the Contents. However it may seem sufficient to some, that thro' the great Number of *Lacteals*, with which this Gut abounds more than any other, the Descent of the Contents, here stript of the most fluid Parts, shou'd in the rest be more sluggish, by reason of their greater Consistence.

Its Length. This *Intestine* is allow'd to possess almost the whole *Umbilical Region*, and its Length is generally computed to be about twelve or thirteen Hands breadth.

Ileum. The ILEUM, which is the third Intestine, is situated below the *Navel*, and fills the *Iliac* with its numerous Folds and Convolutions. It is the *Its Length.* longest of all the *Intestines*, being esteem'd to be one and twenty Hands long: But these Estimates are somewhat arbitrary, because it is not exactly settled





settled among *Anatomists*, where the *Jejunum* ends, or the *Ileum* begins; neither is it easy or necessary to do it. In both this and the preceding *Intestine*, the *Inner Tunic* is much corrugated, the loose Folds of which have been thought to do in some Measure the Office of Valves, and have therefore by Authors been call'd *Valvule Conniventes*, which are fram'd as in the *Stomach*, only by the Inner Coat being larger than the Outward.

Next to this follow the *Thick Intestines*, the first of which is call'd the *CÆCUM*, which has a lateral Insertion into the upper end of the *Colon*, and is not perforated at its other Extremity, but hangs to it like the Finger of a Glove, and is about three or four Inches long.

The true use of this part is not yet determin'd; and some late *Anatomists* have thought that the Name likewise is mistaken, not allowing this to be the *Cæcum* of the Ancients, which they imagin'd to be that thick globous part of the *Colon*, which is immediately appended to the *Ileum*, and therefore they have given this part the Name of *Appendicula Vermiformis*. But this is a Controversy not worth deciding, and therefore I shall pass it over.

This *Cæcum* or *Appendix* is proportionably bigger in Infants than Adults; and in many other Animals, even smaller than in Men, and is at the unperforated Extremity slightly connected to the Right *Kidney*.

The next of the *Thick Intestines* is the *COLON*, which is much the largest, and most capacious of them all. It begins with the *Cæcum*, and is with that connected to the Right *Kidney*, thence with a winding course it proceeds towards the *Liver*, where it is sometimes ty'd to the *Gall-Bladder*, and by that ting'd with yellow. From the *Liver* it runs a-cross under the bottom of

E the

the *Stomach*, where it is by very fine thin Membranes fastned to the *Spleen*, and marches over the *Left Kidney*, where its Cavity is sometimes very much streightned, and descending so to the bottom of the *Os Ileum*, and from thence returning to the upper part of the *Os Sacrum*, and there making the Figure of a Circumflex, it ends in the *Rectum*.

Valve. At the entrance of the *Ileum* into this Gut is placed a *Valve*, form'd out of the Production of the inward Coat of the *Ileum*, which, like the Finger of a Glove, when its Extremity is cut off, hangs loose in the Cavity of the *Colon*, by which means it stops the return of the Excrements, tho' sometimes, as in Inversions of the *Peristaltick Motion*, it proves not sufficient for that Use. It has a great many *Cellulae*, or as it were distinct Cavities fram'd by a Coarctation of the Gut by two *Ligaments*, or Bundles of membranous fleshy Fibres, about half a Finger broad, each running on each side the Gut opposite to each other, the whole length of it, and as it were girding it in at certain distances, thereby making it resemble a Glafs *Incorporator*, used now-a-days to mix Oil and *Vinegar*.

*Liga-
ments.* The next and last of the *Intestines* is the *Rectum*. *RECTUM*, which reaches from the *Os Sacrum* to the *Anus*, and is plain without Cells. It is *Connexion.* fast ty'd to the *Offa Sacrum* and *Coccygis* by means of the *Peritoneum*, and in Men to the Neck of the *Bladder of Urine*, in Women to the *Vagina Uteri*, to which it is strongly connected by a membranous Substance. That Substance of the *Vagina* and *Intestine* are hardly distinguishable from one another.

Length. The *Length* of this Gut is ordinarily about a hand's breadth and an half, and its Capacity about the thickness of three Fingers: Its lower end, the *Anus*, is furnish'd with three Muscles.

The

The first of these is a *Circular Muscle* serving *Sphincter Ani.* to shut the *Anus*, and keep the Excrements from coming away involuntarily, and is call'd the **SPHINCTER ANI.** It is near two Inches broad, and hangs down below the *Intestine* itself near an Inch. It is fastned on the sides to the *Bones* of the *Coxendix*, and behind to the *Os Sacrum*: Before in Men to the *Musculus Accelerator Urinae*; in Women to the *Vagina Uteri*. Some would make this two Muscles, and some three; but that Distinction seems not very instructive; and perhaps not well grounded, and therefore as such I shall lay it aside.

The other two Muscles are call'd the *Levato-Levatores Ani*, and have their rise on each side, from *Ani.* the inner lateral part of the *Ischium*, and end in the *Sphincter* before described. These serve to retract or pull back the *Sphincter*, after the Expulsion of the Excrements; which, especially after hard Stools, is apt to be too far protruded, and to need the Assistance of these Muscles to reduce it. Mr. Cowper, in his *Myot. Reform. Cap. V.* says, That in their Progress to the *Anus*, they on both sides pass close over the *Prostate*, which they compress in *Coitu*, as they also do the *Vesiculae Seminales*, and oblige those Parts to void their Contents into the *Urethra*, in which Action the *Diaphragm* and *Abdominal Muscles* co-operate.

There are farther to be consider'd in the *In-Glands of the Intestines* a great number of GLANDS, which in the *Intestina Tenuia* are gather'd together in the *Intestina* *Congl. me-* rate in the *small Guts.* heaps, as it were like bunches of Grapes. In these Intestines they are very small, and were it not for their Coacervations, scarce remarkable. But in the *Intestina Crassa* they are much larger, *Larger, but Solitary, In the thick ones.* not gather'd like the others, but dispers'd; and though very numerous, come under the Denomination of **SOLITARY Glands.**

These *Glands* discharge a *Liquor* into the *Intestines*, whether ordinarily for any thing more than *Lubrication* of the *Intestines*, and diluting their *Contents*, I will not determine : Though through these seems the greatest part of the discharge to be made ; which either upon extraordinary *Fluxes*, or upon the Administration of *Catharticks*, we have frequent occasion to observe.

Blood Vessels.

These *Intestines* in general are furnish'd with *Blood* from the *Mesenterick Arteries*, which is return'd by the *Meseraick Veins* : But the *Duodenum* receives a *Branch* of an *Artery* from the

Duodena.

Cæliack, which is call'd *DUODENA*, to which answers a *Vein* of the same Name, that likewise returns the *Blood* to the *Porta* ; and the *Rectum*

Hæmorrhoids, Internal and External.

others, which are call'd *HÆMORRHOIDS* ; the *Internal* from the inferior *Mesenterick*, and the *External* from the *Hypogastrick*, with *Veins* corresponding of the same Name, that also go to the *Porta*. These *Vessels* spread the *Intestines* with abundance of *Ramifications*, and are frequently diversify'd in several Subjects of the same *Species* ; much less are they to be depended upon for an uniform Appearance in Animals of a different Kind.

Nerves.

The *NERVES* of the *Intestines*, come some of them from those of the *Stomach*, and some from the great *Mesenterick Plexus*, which distributes *Branches* to all the *Intestines*.

The remaining *Vessels* of the *Intestines* are the *Lymphaducts* or *Venæ Lactææ*, of which in the following Chapter.

C H A P. XII.

Of the Mesentery, Lacteal Veins, Receptaculum Chyli, and Ductus Thoracicus Chyliferus.

THE MESENTERY (so call'd, because it is *Mesentery* in the middle of the *Intestines*, and connects them together) consists of a double Membrane, variously interwoven with a diversity of Vessels, Nerves, Arteries, Veins, Lacteals, Adipose Ducts, and Glands.

It has been ordinarily divided into two Parts, *Divisio*. the *Mesaraeum* and *Mesocolon*; the first appended to the *Intestina Tenuia*, and the latter to the *Crasa*. This is a Division of no great Moment, and therefore no farther to be insisted on.

The *Origine* of the *Mesentery* is deriv'd from *Origine*. the first and third *Vertebrae* of the Loins, where the Productions of the *Peritoneum* form two strong Membranes, which being join'd together make the *Mesentery*.

Between these two is a third Membrane, discover'd by the Learned Dr. *Wharton*, thicker than either of the other two, and perhaps, as some *Anatomists* think, properly to be look'd upon as the *Adipose Membrane*, abounding both with *Blood* and *Adipose* Vessels, wherewith the *Mesentery* is ordinarily plentifully stor'd. *Adipose Membrane.*

The Figure of it is near *Circular*, though for *Figure*. want of room lying in Folds and Wrinkles, it seems but of small Extent, yet when expanded, it is about four Ells in Circumference. *Circumference.*

Its Vessels are the same that we have accounted for in the preceding Chapter.

It has, interspers'd up and down, many *Glands*, which in a sound State are ordinarily cover'd with *Fat*, most of which seldom exceed the Magni-

tude of a small Nut, and are in Number and Position so various and uncertain, that it is in vain to attempt to give a certain Account of them, as to these Particulars.

*Pancreas
Asellii.*

In some Brutes, especially Dogs, there is a large Gland found in the middle of it, which by *Asellius* was call'd the *Pancreas*, to which most of the *Lacteal Vessels* resort; and from thence the *Chyle* is convey'd by large Vessels, but not so numerous as those before spoken of, which have their rise immediately from the *Intestines*, and are call'd *Lactea Secundi Generis*, which Division will scarcely be made out in Men, by any visible Distinction, their *Lacteals* not being gathered so uniformly to one Part, but distributed indifferently to all the Glands of the *Mesentery*.

Uses.

The *Use* of the *Mesentery* it self seems to be, First, To gather the *Intestines* into a narrow Compass, that the Course of the *Chyliferous Vessels* towards their common *Receptacle* may be but short; and next to cover and protect them and the *Blood Vessels*; And, Thirdly, So to connect and dispose the *Intestines*, as to secure them from an Entanglement, which might hinder their *Peristaltick Motion*.

*Origine of
the Lacteals.*

The LACTEAL VESSELS, or VEINS, proceed in great number from the *Intestina Tenuia*, especially the *Jejunum*, from whence they arise in greater number than from the rest. It is yet a Doubt among the *Anatomists*, whether the *Intestina Crassa* afford any or not. The Impossibility of a Human Dissection proper for such an Inquiry, gives no room either to affirm or deny. But the Contents of the *Intestina Crassa* seem not likely to afford much *Chyle*, and therefore if there be any, 'tis probable they are but very few.

In *Brutes*, if dissected at a reasonable time after feeding, two, three or four hours, according to what they have fed upon, they may be seen very tumid and white; and, if wounded, the Chyle flows plentifully from them: But, if inspected when the Stomach of the Animal has been any time empty, they appear like *Lymphaticks*, visible indeed, but fill'd with a transparent Liquor. That the *Lacteals* have a Communication from the Cavities of the *Intestines*, is demonstrated by their Contents the *Chyle*. How their Pores are disposed to receive it, has not yet been discovered: Nor will Microscopes (I am afraid) shew us their Passages in the *Villous Coat* of the *Intestines*; nor is there any way yet known to us, whereby we can fill the *Lacteals* from the Cavities of the *Guts* after Death: We may be allow'd to imagine, that their Entrance into the *Gut* is oblique, not unlike that of the *Ureters*, since neither Wind nor Liquors can pass them from thence. Neither can their Passages be altogether like the *Ureters* into the *Bladder*, because we can no more make *Quick-silver* pass from the Trunks of the *Lacteal Vessels* into the *Guts*, than from the *Guts* into them. Since therefore those Pores of the *Lacteals* can only receive any thing in the Living State, we may be allowed to imagine, the *Peristaltick Motion* of the *Guts* so disposes them, that they then only receive the *Chyle*. This we think may be done by the *Circular and Longitudinal Fibres* of the *Intestines*, still applying the Internal Coat of the *Guts* to their Contents, by which means its Pores absorb the *Chyle* from the Excrementitious part.

After the *Chyle* is got into the *Lacteals*, it meets with the *Lympha* from the *Arteries* in the *Guts*, before it arrives in the Trunks of the *Lacteals* in the *Mesentery*: Though this Communication between the *Arteries* and the *Lac-*

Chyle.
b w soon
made;

Communi-
cation
with the
Intestines,

Manner
of it,

Mixes
with the
Lympha

teals, may be argued from the *Lactæals* having *Lympha* always in them, when they are not charged with *Chyle*; yet we are beholding to an Experiment for rendring it more certain; for by injecting *Mercury* into the *Mesenterick Arteries*, not only the *Mesenterick Veins* but *Lactæals* also are fill'd with it, and the *Mercury* may be driven on to the *Glands* of the *Mesentery*; of which Mr. *Cowper* has several very neat Preparations from *Human Bodies*, as well as *Quadrupeds*; by him, where the *Lactæals* are thus fill'd.

Pancreas
Afellii in
Dogs and
other
Brutes
only.

In *Dogs* there is a large *Gland* in the middle of the *Mesentery*, which, as before observed, is call'd the *Pancreas Afellii*, in which most, if not all the *Lactæals* terminate; and thence proceed in fewer but much larger *Trunks*, to the *Common Receptacle* discover'd by *Pecquet*.

But in *Men* no such *Gland* being ordinarily found, nor *Live Dissections* permitted, the *Vasa Lactæa Secundi Generis* remain disputable: Tho' the *Receptacle*, and *Thoracic Duct*, which are as large as in any *Animals* whatsoever, in proportion to the *Magnitude* of their *Bodies*, leave us no room to doubt of the same way of *Conveyance*, though probably by more and less *Channels* between the *Glands* and the *Receptacle*, for the *Reasons* already given.

Valves in
the Lac-
teals.

These *Chyliferous Vessels*, opening with their little *Mouths* into the *Intestines*, receive the prepar'd fluid part of the *Aliment*, and appear at *Intervals* as it were girt and streighten'd, and when press'd, do not admit of a *Reflux* towards the *Intestines*, tho' the *Liquor* be easily propell'd towards the *Glands*; which argues that there are *Valves* in them, though they are too minute to have the *Structure* or *Form* of them examin'd.

Recepta-
culum
Chyli.

The *Receptaculum*, or *Cisterna Chyli*, lies near the left *Kidney*, under the *Emulgent* and great *Artery*: Its *Capacity* and *Extent* has been found
in

in Human Bodies, to be much larger than hitherto observed. Mr. Cowper has given us a Figure of a Preparation of it fill'd with Mercury, which he has still by him, consisting of three large Trunks, two of which are more than a quarter of an Inch in their Diameters, the third is somewhat less: This Division of it, he thinks, is more requisite in Human Bodies than in Quadrupeds, on the Account of their Position; the latter being Horizontal, the Chyle and Lympha does more readily pass from one large Receiver into this Thoracic Duët; but in Man its Progress being Perpendicularly ascending, it seems necessary to divide this Receptacle of Chyle, as we see in Hydrostatical Engines, in order to take off that Resistance which the Weight of the Chyle would occasion, were it contain'd in one common Receiver.

Its Exit is upwards in the Thorax, from whence it is call'd the *Duëtus Thoracicus*, and it ends in the *Subclavian Vein*. Its Membrane is the same with that of the *Receptaculum*; besides that in the Thorax, it seems to be furnished with another Integument from the *Pleura*. A little more than the third Part of its Way, or about the Middle, it begins to divaricate, but after a Progress of about the Breadth of two *Vertebræ*, it unites again, and at last discharges it self with an oblique Insertion into the *Subclavian*, at which is placed a *Valve*, as there are in divers other Places in the Tract of it, which appear, as in the *Lacteals*, plainer by the Nodes, and the Denial of the Regress of the Liquor when press'd, than from any Demonstration that can be made to the Eye. From hence by the *Subclavian* the Chyle is deliver'd to the *Cava*, and so to the Heart, and thence again to all the Body by Means of the Arteries.

C H A P. XIII.

Of DIGESTION and CHYLIFICATION, and
the Apparatus thereunto conducting.

Organs of
Digestion
very va-
rious.

THE Almighty Author whom (to avoid Circumlocution and unnecessary Multiplication of Words) I often call *Nature*, having in his inscrutable Wisdom thought fit to create a great Variety of *Animals*, and to appoint 'em different Ways of subsisting, has also given them very different *Organs* to prepare that *Aliment*, by which they are to be *Nourished*.

'Teeth,
why dif-
ferently
shap'd and
disposed in
Animals
of diffe-
rent Feed-
ing.

Of these some, being to break, and divide the *Mass* upon which they are to feed, are furnish'd with **TEETH** of different Kinds, according to their several Exigencies: Those, which feed upon *Flesh* have *Teeth* in every Part of *both* Jaws, some of which are to divide the *Mass* into *Morsels*: Others to comminute, and grind it after it is so divided, which from their different Offices are some call'd *Incisores*, or *Cutters*, others *Molares* or *Grinders*. Some *Animals* which are *Graminivorous* have the *Incisores* in the *Lower Jaw* only, because the Matter, upon which they feed, is easily broken into such *Parcels* as they can readily swallow.

Grani-
vorous
Animals
have no
Teeth.

Of the first Sort are *Men*, *Lyons*, *Bears*, *Wolves*, &c. of the latter are all the *Ruminant* Kind, such as have *Horns* and *Split Hoofs*, as *Oxen*, *Deer*, *Sheep*, &c. Others, which are generally such as live upon *Grain*, or other Sorts of *Food*, that do not want to be broken before they are swallow'd, have no *Teeth*; but instead of 'em have an *Ingluvies* or *Crop* wherein the *Food*, which is generally hard and dry, is macerated and softned before it is transmitted to the
Stomach,

But an
Inglu-
vies, or
Crop.

Stomach, which is *Musculous*, and stronger than in other *Animals*, and serves instead of *Teeth*, to break and grind the *Aliment* so macerated, in order to *Digestion*.

Of this sort are most kinds of *Fowl*, especially the GRANIVOROUS: Tho' some others which are *Birds* of *Prey*, and live upon *Flesh*, have no *Teeth*, yet they have something analogous to the *Incisors*, which is generally a *sharp, crooked Beak*, that serves to cut, and divide that, which they feed upon. These have no *Gizzards*, or *Musculous Stomachs*: And tho' there are some which have something like *Teeth* in their *Beaks*; yet those *Teeth* do not serve them either to divide or grind their *Food*, but to take the surer Hold of their *Prey* only, and are peculiar to the *Fishing Fowls*, whose *Prey* would otherways be more apt to escape them, and some of the *Water Fowls*, that eat *Herbs*, which, if their *Beaks* were not indented, would slip from 'em. These as well as some sorts of *Reptiles*, as the *Viper* kind, have *Teeth*, yet swallow their *Prey* whole.

I have mentioned these several kinds of *Dentition* in order only to examin the true Service of *Mastication*, which seems to be in a Manner peculiar to Men. For, tho' some other *Animals* use it, it seems to be only when their *Food* is only too hard, or too dry to be swallow'd unchew'd, as *Lions*, *Dogs*, *Bears*, &c. when Necessity forces them to eat *Bones*: Or *Horses*, *Beans*, *Pease*, *Oats*, or other hard dry Things. In these Cases, *Mastication* seems to be purely preparatory to *Digestion*, and to be necessary to reduce the *Aliment* to such a State as may fit it for the Operation of the *Stomach*. But whether that contributes any more than bare *Comminution* remains yet a Question.

Men, who *Masticate* more upon less Necessity than other *Animals*, are generally thought by Authors to communicate no Ferment.

thors in that *Action* to impart something to the *Mass* besides the *Comminution*, which they think conduces in an extraordinary Manner, by way of *Ferment* or *Menstruum*, to the *Solution* of what they eat. But as this *Mastication* is not constant nor equal in all Men, who seem to digest with equal Facility; it is still a reasonable Doubt, whether some *Uses*, which they have assign'd to *Mastication*, be true ones or not, and whether *Luxury*, and the *Pleasure* of *Eating*, has not taught Men to Chew, more than other Animals, in order to have the fuller Relish of their Food.

Prov'd by
Instances.

It is certain that many Creatures as well provided for *Mastication* as Men, and whose *Salival Glands* discharge as much as the *Human* into their Mouths, do not give themselves the Trouble of so much *Mastication*, and yet with the same *Apparatus* of *Organs* digest as quick, if not quicker, than Men do. And if *Old People*, who have lost all their *Teeth*, have sometimes worse *Digestions* than those who have not, other Causes may reasonably be assign'd for that Infirmary of *Digestion*, than the Want of *Teeth*. For it is observable, that *Younger Persons*, who sometimes from other Accidents lose their *Teeth*, have not their *Digestive Faculty* weaken'd in Proportion; not to mention that many *Animals*, which have either no *Teeth*, or don't use those they have to chew with, seem to have as vigorous a *Concoction* as those that do. However I shall not deny, but that the *Comminution* of the *Aliment* between the *Teeth*, serves to promote, and hasten the *Solution* in the *Stomach*, which it may do by bare breaking the Cohesion, without supposing any Necessity of a *Menstruum* to do it afterwards.

Small
Birds, especially
Parrots, have
something
equivalent
to Mastication.

Many Species of BIRDS, especially the little Ones, that feed upon the smaller sorts of Seed, and

and have no *Teeth*, nor any thing that bears Analogy to them (except the sharp Edges of their little *Beaks* may be thought to do so) make however an use of these *Beaks*, which in some Measure answers the end of *Mastication*. For by these they crack the Seeds, and with the Help of their Tongues separate the soft Pulp from the dry Husk which they let fall: And particularly all of the *Parrot* kind, which will feed upon the Kernels of Nuts and other things, which are too large to be swallow'd whole, have a sort of Action, which looks very much like *Chewing*, by which they nibble upon what they Eat, till they reduce it to very small Parts, tho' it seems not so much in order to mix it with any *Ferment*, as to reduce it to such a State, as may make it pass the easier; and perhaps if they have any *Saliva*, it is no more than serves to lubricate, and facilitate the slipping of their Food down to the Stomach, which would not be so easily effected if it were dry, as most of the things they live upon are.

Those that generally feed upon *Grain*, as all *Ingluvies* the *Gallinaceous*, *Turkey*, *Pheasant*, and *Partridge* or *Crop*, kind do, are observed to swallow every thing ^{answers} hastily, without any Stop of it in their Mouths, ^{the end of} Teeth ⁱⁿ or any Endeavour to break it there. But then ^{Grani-} indeed they have an *Ingluvies* or *Crop*, where ^{voracious} it remains some time for *Maceration*, before it be ^{Fowl.} transmitted to the *Stomach*, which those that contend for a *Ferment*, may say is given them instead of *Mastication* to impregnate the Aliment with that *Ferment*, which however is *gratis dictum*. For tho' the *Crop* of such *Fowls* be furnish'd with *Glands*, and the *Grain*, which they Eat, be actually softned by the Soaking which it receives there; yet no real Solution or Separation of Parts is there made, but in the *Gizzard*, the Strength of whose *Muscles*, and *Internal Membrane*, which is hard and dry, as well as the little

little *Stones*, and *Grains of Sand*, which these little *Fowls* swallow, shew these Parts to be contrived for *Attrition* and not for *Fermentation*, which the Narrowness and Strength of those Parts will not give room for.

Lower
Extremity
of the Oe-
sophagus
Glandu-
lous in
Fowls,
that have a
Gizzard.

It is true that most, if not all *Fowls* of this kind, have at the lower end of their *Oesophagus* a considerable Quantity of *Glands*, which afford a *Liquor* more visible than even those of the *Crow*, and which many *Anatomists* suppose to separate a *Fermentative Juice*. But for that we shall assign another Use, (which it cannot be deny'd to be proper for) when we come to speak of the *Conversion* of the dissolved *Aliment* into *Chyle*.

Teeth in
many
Animals
not used
for Masti-
cation tho'
very sharp.

There are divers kinds of *Animals*, that not only have *Teeth*, but have them likewise sharper, and more numerous than *Men*, or indeed any sort of *Quadrupeds*, as divers kinds of *Fishes*, and all the *Serpent* kind, yet none of these use them for *Mastication*, as appears from their Figure and Po-
sition, which renders them absolutely unfit for

Indented
in Fishes.

it. For in *Fish*, many of which have three, four, or more Rows of *Teeth* in each *Jaw*, they are generally extreme sharp, and not planted opposite to each other, but so as to make, when the *Jaws* are closed, a kind of *Indentation* like that of two Saws, so wrought as to receive each other mutually, which is not a Position proper for *Grinding*, but very convenient for *catching* or laying hold of any thing. In the *Serpent* kind there are likewise divers Rows of *Teeth* extremely sharp, but all incurvated, and pointing towards the *Throat*, which is a Situation very proper for entangling, and helping to swallow their *Prey*, which is usually small living *Creatures*, which they devour whole, but altogether unfit for dividing, comminuting or bruising. Some sorts of *Fish*, which prey upon the small *Shell-Fish*, such

Recurved
in the
Serpent
kind.

Wherefore
Grinders
in some
sorts of
Fish.

such as *Cockles*, *Muscles*, and *Sea-Snails*, have indeed a sort of *flat, broad Teeth*, which resemble in some measure, in Use, as well as Figure, the *Grinders of Land Animals*; that is, they serve to break the Shells of those little Fish before-mentioned. These are variously disposed in the different *Animals*, some in the *Throat*, or upper Part of the *Oesophagus*, as in the *Orbis Marinus*, others even in the *Stomach* it self, as in *Lobsters* and *Crabs*, which have three at the Bottom with peculiar *Muscles* for their Motion and Compression.

As *Providence* has allotted for the Sustenance of *Variety of* the several *Kinds of Animals* a great *Variety of Stomachs* *Food*; so it has given them likewise a proportionable *Diversity of Organs* for the Preparation of *Food* ^{reducible} *it*, besides those which serve for the first *Division* ^{to three} *Heads* ^{General} and *Mastication* already spoken of. The various *Kinds* ^{of} *Animals* have, according to the different Occasions of their kind of Aliment, a great *Variety of Stomachs*, both in Point of Number and Structure, which may however, in the main, be reduced to three Principal or General Heads, of which in order to illustrate our Notion of *Concoction*, we shall speak more particularly. For tho' the several *Species* be almost indefinite, yet these being most considerable and best known to us, may suffice to shew the *Mechanical Apparatus of Nature* for this Operation.

The three I mean are the *Carnivorous*, the *Graminivorous*, and *Granivorous*. The different *Mechanism* of whose several *Stomachs* seems under one Head or other to include all the Conditions necessary for the *Solution* of any thing conducing to *Animal Nutrition*: And of each Species of which there are some Animals in each habitable Element, unless we will deny any *Fishes* to be strictly *Granivorous*, the Water not spontaneously affording them any such sort of *Food*.

Accor-

Account
of Appe-
tite why
Postpon'd.

According to the usual Method, *Hunger* should first be accounted for, because it is that which provokes us to Eat, and therefore the accidental Cause of all that follows in the Course of *Digestion*. But that being agreed by all *Authors* (however differing among themselves otherwise in Opinion,) to depend upon the same *Active*, or *Efficient Cause*, with *Digestion* in it self; it will save an unnecessary Multiplication of Words to Postpone the Account of it to that of *Concoction*.

Disagree-
ment of
Authors
about the
immedi-
ate In-
strument
of Conco-
ction.

Authors are very little agreed about the immediate Instrument by which the Aliment is dissolv'd in the *Stomach*. Some will have it to be done by mere *Attrition* or grinding by the *Stomach* it self. Others impute it to a forcible *Dissolution* of *Heat*. But the Opinion, which is most espoused, is, that it is perform'd by means of a *Ferment* or *Menstruum*; yet of what Nature, or to what *Class* it belongs, they are as little agreed among themselves, as with those who would have it perform'd some other way.

Attrition
or Grind-
ing.

Those that would have it done by *Attrition*, impute it to the rubbing of the *Stomach*, upon the Aliment, by its *Peristaltick Motion*, and fortify themselves by the Observation that *Fowls*, and *Birds* that eat *Grain* and *Seeds*, have not only a strong *musculous Stomach*, lined inwardly with a *thick, tough Membrane*, fit for grinding, but do likewise assist that Operation of the *Stomach*, by swallowing *Grains of Sand*, and *little Stones*, which are always found mixt with their *Meat*, in the *Gizzards* of those *Fowls*, when they have eaten hard *Meat*, unless it be in *Domestick Fowls*, which have been coop'd up, and restrained from coming at them.

Not the
Digestion
of Grani-
vorous
Animals.

If indeed Men did feed, as those *Fowls* do, upon *Grain* or hard *Meat*, without *Mastication*, and were furnished with a *Stomach* so tight, firm, and

and strong, and so lined, this would not be an improbable *Hypothesis*; but as our Food and manner of eating are very different, so is the Mechanism of *Nature*. And as the *Texture* of the main *Organ* of *Concoction*, the *Stomach*, is soft, smooth, and yielding, (Qualities altogether opposite to those that are requir'd to grinding) so Providence has given us an Appetite to things *resoluble* another way. But if *grinding* or *attrition* were the *human* way of *Digestion*, the *Mouth* surely, and not the *Stomach*, would be the proper Place where it should be perform'd; for that is furnish'd with *Teeth*, proper Instruments for that purpose. But whatsoever *Mastication* may contribute towards *Digestion*, that it is not the only, nor indeed the main Instrument of it, we have already sufficiently proved by the Instances we have given of the many Animals, the Substance of whose Food is the same with ours, which *masticate* very little, and most of 'em not at all.

Wherefore if the *Stomach* were capable of grinding the Aliment, as some suppose, it must however in a little time necessarily be worn, as all other Bodies, which grind by Degrees, are, how hard soever; especially since many things, which we use as Food, are harder and tougher even than the *Stomach* it self.

But they are mistaken, who think that even *Macera-*
in *granivorous* Fowls, the *Grain* which they eat *tion pre-*
is ground in the *Gizzard* when hard. For that *icious to*
Grain, which is found in the *Gizzards* of those *Attrition*
Creatures, is, tho' unbroken, always macerated, *even in*
swell'd, and soft: So that the *Gizzard* has not *the Grani-*
much more to do, than to break the *Husk* or *vorous.*
Cortex of it, to reduce it to a *Pulp*. And for
this very end it is, that all this sort of Animals
are furnish'd with an *Ingluvies* or *Crop*, where
the Aliment always makes a considerable stay,
F and

and in which it is often found soft, tho' always unbroken, if it be *Grain*. Whether this *Maceration* proceeds from any *Liquor* separated by the *Glands* of the *Craw*, or from the *Water* which those *Fowls* drink, may be a reasonable *Question*. But as those *Glands* do not seem sufficient of themselves, to furnish *Liquor* enough for that purpose without their *Drink*; so on the other hand it is not unreasonable to believe, that the *Liquor* which they afford may contribute towards making their *Drink*, with which it mixes, more active and piercing, and so serve to soak it better and quicker than simple *Water* would do.

Nor Elix-
ation, or
Dissolution
by mere
force of
Heat.

Difficul-
ties affect-
ing this
Hypothe-
sis.

Those that would have the *Aliment* to be dissolved in the *Stomach*, by the mere *Virtue* of *Heat* only, like a kind of *Elixation* or *Stewing*, will find a great deal of difficulty to prove their *Hypothesis* reasonable, unless they call in some other *Mechanism*, or *Circumstance*, than I have hitherto had the *Fortune* to meet with among their *Arguments*. For none of them, that I know of, has given a satisfactory *Reason*, why *Meat* should dissolve faster in the *Stomach* than it does out of it by the same degree of *Heat*, or indeed a much greater. It would be impertinent at this time of *Day*, to pretend that *Culinary Fire* was not so *Natural* a *Dissolver*, as the *Vital Animal Heat*; and yet no *Care* has been taken by those that hold this *Opinion*, to find out any other certain *Property* of this *Heat* to which they might rationally ascribe that *Acceleration* of *Solution*, which is observ'd in the *Stomach* by many degrees to out-strip that *Dissolution*, which is made in the usual *Organs* over a *common Fire*: And to pretend that the *Heat* was actually greater, and more intense, than that which is us'd in *Cooking* our *Victuals*, would not only be a bare-fac'd *Assertion* against *Fact*, but against *Reason* likewise: For if it really were so, why should

should not the *Stomach* it self be *boild* and *dissolved* by the *Heat*, as well as the *Meat* contain'd in it, which would constantly happen in all other Operations by Fire or Heat, if the Matter contain'd were as hard to be dissolv'd, and would resist as strongly as the Vessel containing? But not to pursue an Opinion any farther, which in my Judgment at least has a better Foundation than those who have casually espoused it, have hitherto been able to make out, we will proceed to examine the reigning *Hypothesis*, which, taken in its largest extent, is become of late the Favourite, and only prevailing Opinion.

Those, who observing how unqualify'd the *Stomach* of *Carnivorous* Animals generally is for *Attrition* or *Grinding*, and therefore could not believe the Aliment to be reduced to a Pulp that way, and yet were not satisfy'd that the Incalcescence of the *Stomach* was sufficient for that Operation, have call'd in the help of a *Menstruum* or a *Dissolvent* Liquor, by means of which, they have thought to account better for the speedy *Resolution* of the Contents of the *Stomach*, than by either of the other more *Simple* ways.

But this being matter rather of *Imagination*, than *Fact*, easier to be supposed than prov'd, after first conceiving a necessity of such a Liquor, they have employ'd themselves more generally to invent the *Properties* and *Qualifications* of it, than to discover whether in reality it had a *Being* or no. So that this *Hypothesis* stands altogether upon Conjecture, as well as the *Existence* of their *Menstruum*; as to the *Nature*, *Properties*, and *Derivation* of it. From hence it comes to pass that such a variety of *Menstruums* have been invented, every Man feigning it to be such as he conceived would best answer the Difficulties and Doubts which he proposed to himself, to resolve by it. Hence some have fancy'd it to be an *Acid*,

No Ferment or Menstruum peculiar to any of the Organs of Digestion.

Various Menstrua the Product of Imagination only.

others *Alkalious*, a third sort *Sulphureous*, a fourth *Acido-Sulphureous*, others *Alkalino-Sulphureous*, *Muriatick*, or of any other kind that their *Fancy* suggested to them, as proper for the *Work of Dissolution*, or exciting of *Appetite*.

Various Derivations of the Menstruum.

As many Conjectures they have had about the Place of *Nativity* of this *Menstruum*: Some fetch it from the *Spleen*, by the *Vas Breve*; others from the *Brain*, by the *Nerves*: Some from the *Blood*, by the *Arteries* in the *Stomach*, and others from the *Glands* of the *Mouth* and *Stomach*; in favour of all which, curious *Notions* and fine *Speculations* have been advanced at the *Expence of Truth*.

Acid Ferment, h.w. taken up.

The *Chymists*, and *Physicians* chymically given, have generally been the *Patrons* of an *Acid Ferment*, upon a *Notion* at large, that *Acids* are the *Universal Dissolvents*; which *Opinion* many others have given into upon the *Account* of some few *Phænomena*, which they could, or thought they could, resolve by it; but especially upon the *Account* of an *Aphorism* of *Hippocrates*, which they think countenances it, tho' mistakenly.

Hippocrates's Meaning mistaken.

This great Father of *Physick* has, *Aphor. 1.*

* Εν τῇσι
χερσὶν
λακίσεσιν
σιν ὄξυς
μὴν ἐπι-
γαστρῶν.
μὴ γαστρῶν
πρὸς τὸν
σπλῆνός α-
ναδόν.

*Sett. 6. said, That * ACID BELCHINGS supervening upon inveterate LIENTERIES, (that is, upon Loosenesses from a too great Slipperiness of the INTESTINES) where they were not before, are a sign of mending. And Lib. 7. Epidem. he says again the same thing, a little more at large, and affirms, that whether this Symptom come spontaneously, or be procured by Art, it equally cures the Distemper, ἵσως δ' ἐστὶ καὶ τεχνήσασθαι, καὶ γὰρ αἱ ταραχαὶ αἱ τοιαῦται ἀλλοιοῦσιν. ἵσως δ' ἐ καὶ ὄξυς μὴ λακίσειεν ἐν λύσει. From hence some would infer, that Hippocrates suppos'd Acids to contribute to good Digestion; because those Signs of Acidity in the Stomach, whether they come spontaneously, or were artificially super-induc'd, generally signify,*

And his Authority brought to countenance a false Notion.

fy, according to him, a *Solution* of that Disease which was attended with *Crude Dejections*.

But, in my mind, they strain his meaning very much, who will, from either of these Passages, make the *Divine Old Man* hold that the *Acidity* of the *Stomach* was necessary *ad Eupepsiam* in the *Natural State*. Whereas in truth all that he says in this case, concludes no more, than that these *Acid Belchings* signify'd that the State of the sick Person was alter'd for the better, when the *Assumpta* remain'd so long as to turn sour upon the *Stomach*: Or at most, that *Acids* given inwardly, and staying so long as to send their Exhalations upwards, might contribute to the Cure; a Position which any Body may admit, without supposing an *Acid* to be the necessary Instrument of *Concoction* in a *Natural State*. But what Signs soever *Acid Belchings* may be, in a *Morbid State* of this kind; no sort of *Ructus* or *Flatulence* whatsoever is any Sign of a good Digestion in a State of Health.

However, they that have been prepossess'd in favour of an *Acid Menstruum* in the *Stomach*, have very greedily laid hold of this Occasion, to draw so great an Authority over to their side.

The other Argument, which they bring for their Opinion from the Observation, that *Acids* provoke *Appetite*, is as much strain'd and fallacious as this. For tho' *Acids* may, by pricking and vellicating the *Stomach*, procure a Sense of *Hunger*, and perhaps by mixing with, cutting, and precipitating that *Viscous Phlegm*, or Matter, with which the *Stomach* is sometimes over-loaded, even to the Prostration of *Appetite*, may accidentally procure a better *Digestion*, as they scour and cleanse the *Stomach*, yet that is no Proof that any such sort of *Menstruum* is necessary and primarily employ'd by Nature in the Action of *Digestion*. For divers other things which are not manifestly *Acid*, and

some that are even opposite to, and destructive of *Acids*, will sometimes do the same thing, as is notoriously known of the *Bitters*, especially to all *Practitioners* in *Physick*, and in some Cases, when judiciously apply'd, of the *Volatile Animal Salts*, and *Lixivial Vegetable* ones.

Acids im-
proper In-
struments
of Chyli-
fication.

But neither do *Acids* seem naturally fit to promote *Chylification*, or to produce a *Liquor*, which they are of themselves so prone to coagulate, as we daily see by those *Coagulations*, which the slightest *Acids* produce in *Milk*, which is nothing else but *Chyle* a little defecated. For tho' *Milk*, upon standing, will indeed turn sour without any other mixture; yet whenever it does so, Experience shews that the Form of the *milk* is immediately destroy'd by it, and sufficiently demonstrates thereby that such a State of *Acidity* as these Men would suppose, is utterly inconsistent with the Being of that *Liquor*. Neither do they shew us, that if they could possibly consist together, there is in a *Human Body* any *Matrix* that should produce and furnish this *Acid Menstruum*, either in the *Stomach*, or any other Part.

Acid Re-
mains of
Chyle not
sufficient,
if existent.

The *four remains* of *CHYLE*, which (after the Learned Dr. Glisson,) Dr. Willis, and so many others have taken up with, (for want of a better Expedient, that might have some Shew of a real Existence) to do the office of an *Acid Ferment*, or *Menstruum*, to cut and divide by its sharp corrosive Parts the new ingested Aliment in the *Stomach*, in so short a time as *Digestion* is ordinarily made in, is by no means an Instrument sufficient for the Purposes assigned. For, besides, that it is a Question whether any Part of the *Chylous Mass* does ever remain behind in *statu sano* in the Folds of the *Stomach* after *Chylification* complete, and Exinanition into the *Intestines*, it is still a farther Question, whether those Remains be naturally *sour* or not. *Autopsy* has never (that I know of)

of) favour'd the Affirmative part of either of these Points; but has very often decided directly to the contrary, as I have frequently experienc'd in *Dogs*, which are as proper Subjects for such Tryals, as we can even desire. In these I have often expressly sought for these Remains of *Chyle*, but could never see any signs of any such thing, nor taste any the least Degree of *Acidity* upon the *inner Coat* of the *Stomach*, tho' I made my tryals upon 'em, when their Appetites appear'd to be as keen as they could possibly well be, and consequently this supposed *Vinegar* of the *Stomach* should have been in its highest state of Exaltation. Neither would any of 'em turn *Milk*, tho' I sometimes boil'd 'em in it, and at others kept it in them, as long as was reasonable to avoid making a fallacious Experiment.

Those that plead for these *Acescent Remains* of *Plicæ Chyle* thought themselves sufficiently warranted, ^{of the} by the *Plicæ* or Folds of the *inner Coat* of the *Stomach*, ^{not made} to suppose a residue of some kind or other, ^{to detain} and which they, supposing it to resemble *Milk* in ^{any part} that Property too, expected should turn Sour. ^{of the} Not to insist here upon the Infirmary of Reasonings drawn from *final Causes*, or from *Analogies* not sufficiently consider'd, both which are to be found in this *Hypothesis* of the *Acid Remains* of *Chyle*: It is easy to shew that the *Rugæ* or *Plicæ* of the *inner Membrane* of the *Stomach* were not unnecessarily fram'd only to detain this Matter, which they dream of, but upon Mechanical necessity. For the *outer Tunic* of the *Stomach* be- ^{Mechani-} ing made *Fibrous* and *Contractile*, or *Dilatable*, ^{cal neces-} according as the *Stomach* is empty or full, the ^{sity of} *inner* must necessarily obey its Motions, and ei- ^{these} ther shrink up, or dilate with it, or otherwise lie wrinkled or folded up, when the *Exterior* was not dilated. But this *Contractility* is not to be found in any *Glandulous* or *Villous Membranes*, ^{Plicæ.}

and consequently that it might sometimes be dilated to all the Dimensions of the *Stomach* when full, and yet comply with all its Coarctation in its narrowest State of Contraction (which Membranes of this Nature have no Power to do) it must be made to ply and fold as this Membrane does.

Use of that
Structure.

Those that love *final* Reasons for such things may be satisfy'd to know, that it is by no means convenient that the *inner Coat* of the *Stomach* should be endow'd with a power of Contraction like the *outward*. For all such *Contractile Membranes* are extremely *senfile*, which, upon many Scores, it is not proper the inside of the *Stomach* of Animals should be; since by its insensibility it is guarded against innumerable Provocations, which otherwise could not be avoided; and does here to the *senfile Parts* of the *Stomach*, what the *Cuticula* does to the *Cutis*.

Different
Effects of
Rennet,
and the
suppos'd
Remains
of Chyle
in the
Stomach.

Indeed many of those, who have contended for an *Acid Ferment* in the *Stomach*, have been very sensible of the insufficiency of any such *Acid* as might be form'd out of the *Remains* of *Chyle*. And have look'd out for other means, notwithstanding the famous Instance of the *Rennet-bag*; whose *Liquor* being Salted, and Pickled, bears no Analogy to what was found in the *Calve's Stomach* before Pickling: Nor indeed are the Effects of the *Rennet* so made any thing like to what they ascribe to this *Menstruum*; for that coagulates, and this dissolves: This digests the *Milk*, which the *Calf* lives upon: And that destroys it, and renders it less fit for Nourishment than before.

Meats
Pickled
or Salted
made
harder of
Digesti-
on.

All the Tryals that have been made by *Artificial Digestions* to dissolve *Flesh*, have been made with *Acids* of another Class and Nature, than *sour Milk* or any of that low form of *Acids*, which they have found by Experience to preserve,

serve, not destroy it, as *Vinegar* and those *Salts* which abound with *Acids* do. Neither are those *Meats* so preserved, more obedient to the *Faculties* of the *Stomach* for having been *Pickled*, or of better *Nourishment*, as they should be, if they contain'd any thing congenial to the *Natural Ferment* of the *Stomach*: But on the contrary they become *harder* of *Digestion*, and of *less Nourishing Juice*.

Dr. *Havers* finding those *Acids* insufficient to Dr. Ha-
dissolve and reduce *Flesh* to a *Pulp*, proposes an ^{vers's Ex-}
Experiment with *Oil* of *Vitriol*, which he says ^{periment}
will do it. But being well aware of that obvi- ^{with Oils}
ous Objection, that it is morally impossible for ^{of Vitriol}
the *Stomach* (without the utmost danger) to bear ^{and Tur-}
so highly corrosive an *Acid*, he proposes to qualify
it by an *Oleaginous Mixture*, something like *Oil*
of *Turpentine*. To illustrate this Notion, he puts
Raw Flesh, *Crums* of *Bread*, *Oil* of *Turpentine*,
and *Oil* of *Vitriol* together; and after shaking
them well, commits them for four *Hours* to-
gether to *Digestion* in *Balneo Mariæ*; and then up-
on shaking his *Glass* again, he finds the *Meat*
dissolved, and all together making up a thickish
Pulp: From whence he concludes that the *Men-* And Hy-
struum, which dissolves the *Aliment* in the *Sto-*pothesis.
mach, must be something of the Nature of the
Mixture of those *two Oils*.

But (with all due regard to the *Notions*, and ^{Deficient}
Experiments of so *Ingenious* a *Man*) he has been ^{in many}
too hasty in drawing his *Conclusions*, and should ^{Particu-}
have register'd the other *Phænomena* of his *Expe-*lars.
periment, before he rais'd so large an *Hypothesis* up-
on so narrow a *Bottom*, as the seeming *Agree-*
ment in one single *Accident*, viz. the *Reduction*
of the *Meat* to a *Pulp*. He should have shewn
that this *Pulp*, or the *Liquor* which it afforded,
agreed perfectly in *Taste*, *Colour*, *Smell*, *Consis-*
tence, and other *Accidents* with the *Chyme* or
Chyle,

Chyle, that result from Animal Digestion. But, unless the Liquor, which this Mass afforded, was such a *Sweet, Soft, White Inodorous Juice*, all the Demonstration his Experiment amounts to, is, that the Oils of *Vitriol* and *Turpentine* mix'd, will resolve and reduce *Flesh* to a *Pulp*, but will not make *Chyle*; which shews his Experiment something worse than unconvulsive, that is, it is convulsive against the Use he would make of it.

Not helped
by his
other two
Experi-
ments.

However the Doctor is so satisfy'd in the sufficiency of his Experiment, that he proceeds to inquire how this *Fermentative Vitriolick Terebinthinate Mixture* is form'd in an *Human Body*, and imagines to find two divers sorts of Liquors, one *Acid*, and the other *Sulphureous*, separated from the *Salival Glands*, and mix'd in, or about the *Mouth*, which, though apt to ferment upon their first Mixture, are yet, perhaps, apt to do so more considerably when they come to be digested by the Heat of the **STOMACH**. And in this Opinion he fortifies himself with two other Experiments, which he made after the same manner upon *Meat*, with Oil of *Vitriol* mixed severally, one with a Solution of Salt of *Tartar*, the other with Oil of *Camphire*, which did not succeed so well as the Experiment with Oil of *Turpentine*: From whence he draws this particular Conclusion. *And

* Dis-
course con-
cerning
Concocti-
on, read
before the
Royal So-
ciety by
Dr. Ha-
vers, May
1699.

I do the rather think one of those Juices which constitute the *Saliva*, to be of the Nature of Oil of *Turpentine*, than of a fixed Salt, because it will correct and temper even Oil of *Vitriol*, so as to render it more tolerable to the *Fibres* of the *Stomach*. Not that I suppose the *Acid* part of the *Saliva* to come near to the *Acidity* of Oil of *Vitriol*. For tho' when they are mixed, they will make a *Liquor* that may not be injurious to the *Stomach*: Yet that *Acid Juice*, if it were so corrosive as Oil of *Vitriol*, would certainly be injurious and painful to the *Salivatory Ducts*, which convey it to the *Mouth* before

fore it is mixed with the Oleaginous Liquor. But I only say it is an Acid, and in some degree approaches to the Nature of that Oil.

It is obvious for the Reader to discern, that this *Hypothesis* stands purely upon the Foot of ^{Precarious} Foundation the Experiment before-mentioned, which has ^{of this} been shewn to be insufficient. But if it were ^{Hypothesis.} not, nothing could make it certain, but the Actual Demonstration of the real Existence of such Liquors sincere, and apart in the Body, and their Conveyance together into the *Stomach*. For this purpose the *Doctor* assigns two pair of the *Salival Glands* to the Separation of the *Acid Liquor*, and the other two Pair for that of the *Oil of Turpentine*, as distinctly as if he had really found, and examin'd them sufficiently apart, which is the more surprising, because it is in reality no hard matter to do it, and that Experience does constantly shew, that these *Glands* do not afford *Liquors* so much as sensibly distinguishable, and that the Liquor which they do afford, does not in the least resemble either *Oil of Vitriol*, or *Oil of Turpentine*, or any kind of *Acid* or *Volatile Essential Oil* whatsoever. Nor indeed does any part of the *Body* afford any such kind of *Substances* at any time, or by any *Trial* or *Analysis* whatsoever.

The Objections, which lie against this *Hypothesis* and that before-mentioned of the *four* *Chyle*, reach all sorts of *Acido-Sulphureous Menstruums* in the *Stomach*. For, if they be *temperate* like the first, they will not be *corrosive* enough to procure a *Solution*: If they be not, but *exalted* Acids, they are liable to the same Exceptions just now offered, and nothing resembling either of them, in either State, is to be found among all the *Animal Fluids*.

Those that hold the *Menstruum* of the *Stomach* to be *Alkalious* or *Alkalino-Sulphureous*, are somewhat

Acido-Sulphureous Menstrua, all *obnoxious* to the *same* Exceptions.

Alkalious or *Alkalino-Sulphureous*, a more plausible Invention.

Animal
Substan-
ces all
yield Vo-
latile Al-
kalies.

But not
unalter'd
by the
Fire.

This Ob-
jection
holds
equally
good
against all
sorts of
Menstrua
in the
Stomach.

somewhat more countenanced in their Opinion, by the Substances which may be produced by the help of Fire from all sorts of *Animal Fluids*, all which yield *Volatile Alkalious Salts, Spirits, Phlegm, Oil, and Caput Mortuum*, differing only in proportion according to the different Mixture of the Liquor it is drawn from, whether that be *Urine, Blood, Bile, or any other*. But though all these Substances may be drawn from the *Natural Juices* of the Body, and may be allowed to have pre-existed in them; yet it must be confess'd that all of them are in some Measure alter'd by the Fire, though that Alteration may, perhaps, be no more, than would result from any other *Resolution* of their Mixture. However, if any of them will, after this Separation, act so vigorously upon *Flesh*, as to dissolve it in such a *Heat*, as that of the *Stomach* may be granted to be, that Activity is certainly owing to the *Exaltation* which it had from the *Fire*. For no where in the Body, in its *Natural State*, do we find any *Salts* or *Sulphurs* so exalted, as to be capable of making such a *Dissolution*.

Neither can I see (let this exalted *Salt* or *Sulphur* be convey'd by what ways or means soever, the *Patrons* of this Opinion will or can suppose) what hinders the *Menstruum*, that so readily dissolves the *Aliment*, from touching the *Stomach* it self, which is oftentimes of the same, or slighter Texture, than even the Matter it self, which it digests: And one might as well expect, that *Aqua fortis* put upon pieces of *Iron*, in an *Iron Pot*, should dissolve the pieces of the Metal, without touching the Vessel, which is an Experiment, I doubt, no *Chymist* would be persuaded to try.

This Objection, indeed, holds good against all kinds of *Menstrua* in the *Stomach*, as *Digesters*, whether we suppose an *Acid*, or *Alkalious, Saline,*

line, or *Sulphureous*, or however mixed : For still the Matter to be wrought upon is the same, or of the same kind, with the Vessel in which it is to work. They therefore, that will have a *Menstruum* to be the *Efficient Cause* of the *Dissolution* of the *Aliments* in the *Stomach*, are obliged to find something in the *Aliment* it self, before it comes into the *Stomach*, (which must be a Condition the *Stomach* it self has not) that disposes it to receive the Impression of the *Menstruum*.

This some endeavour to find in the Impreg-
 nation of the *Aliment* with *Saliva* by means of *proper*
Mastication. But, if the *Saliva* were a Juice so *Menstru-*
 very acrimonious, it would be impossible for it *um*.
 never to offend the *Stomach*, especially consider-
 ing the quantities of it that many swallow even
 upon an *empty Stomach*. However, the ready
Digestion that those Animals have, which do not
masticate at all, but swallow their *Prey whole*,
 of which I have spoken at large in the begin-
 ning of this Chapter, demonstrates the Insuffi-
 ciency of that Cause.

Whatsoever therefore this *Ferment* or *Princi-*
 ple of *Fermentation* is, that sets the Wheels of *Dis-*
solution so nimbly a going, it must be something *Menstru-*
internal, and *inherent* in the *Aliment* it self, which *um, or*
 is an Opinion of ancient standing, but has been *Principle*
 rejected for that of a *Menstruum*; because an in- *of Dige-*
 ward Cause or Condition sufficient for this great *stion, must*
 Operation, was not so expressly, and by Name *be some-*
 assign'd, as that speculative and curious Men *thing In-*
 might have wherewithal to satisfy their Enqui- *ternal, and*
 ries, and judge for themselves of the Truth of *intimately*
 the *Hypothesis*. However, they that went thus *inherent*
 far, tho' they did not clearly and explicitly dis- *in the Ali-*
 cover all, did good Service to Truth; and had *ment it*
 they, who rejected that Opinion, been as scrupu- *self*.
 lous about the Evidence of those others, which
 they took up in its stead, it is probable it had not
 lost

lost ground, but that the *Latent Property*, upon which this grand *Phænomenon* depended, had long ere now been brought to light.

Three
things pre-
viously to
be con-
sidered.

In order therefore to discover what this great Secret is, which has been so long sought after with so much Industry, and so little Success, it will be necessary to consider three things.

First, What is the *State* or *Condition* of the ALIMENT, as *Nature's*, or *our own* Preparation offers it to us, before it enters the MOUTH.

Aliment
reducible
to two
General
Heads. Of
which

2^{dly}, What *Changes* it undergoes in the MOUTH, before it reaches the STOMACH. And,

Two
States. In
their First
or Natu-
ral State,

3^{dly}, What it suffers in the STOMACH, in order to a thorough *Dissolution*.

which
Two
States. In
their First
or Natu-
ral State,
subject to
unavoida-
ble Dissol-
ution.

First then, All those *Substances*, upon which any sorts of *Animals* feed, may be reduced to one of these two General Heads, either of ANIMAL or VEGETABLE, (for I know of no Creature that lives upon *Minerals*) which being Substances of their own Nature perishable, or subject to decay, their *Dissolution* may be hastned or retarded by Accidents.

Their Se-
cond a
State of
Actual
Decay.
Yet quick-
ened by the
Changes
wrought
upon them
in the
Mouth,

Secondly, All those *Substances*, before they come into the MOUTH, or at least as soon as they come into it, are deprived of their ANIMAL or VEGETABLE *Life*, and consequently in a State of *natural Decay*, the *Principles* or Means of which they carry along with them, which are only put into, or hastned in their Action, by the *Changes* which they suffer in the *Mouth* or *Stomach*, &c.

Ec. These
attended
to, shew
the Reason
of the Va-
riety of
Organs
for Ani-
mal Dige-
stion.

From these things well attended to, we shall not only be able to observe the *Means* which *Nature* uses in the *Dissolution* of the *Food* in *Animal Stomachs*, but likewise of the great variety of Organs which she has made for that purpose; at least, we may by Attention arrive at it for those of whose *Anatomy* and way of *Living* we know the *History*.

Of

Of all these kinds, which are reckon'd perfect, ^{Organs of} the *Apparatus* for *Digestion* is most Simple in the CARNIVOROUS, (most of which will live ^{why most} upon Fruits likewise) in which their *Organs* are ^{Simple in} suited to their Dyet, which is the easiest of ^{Carnivo-} *Digestion*. For *Flesh*, *Fruits*, and *Sallad-Herbs*, being the most succulent of all the kinds of *Food* which any *Animals* naturally eat, they ferment of themselves, and come to a *digestive Solution* much more readily than *Grain* or *Seeds*, or any kind of *dry Vegetables*. ^{rous Ani-} ^{mals.}

Men do however generally prepare those ^{What} things which they eat, especially the *Flesh*, by ^{Dressing} divers kinds of *Dressing*. Whether this Custom ^{of Meat} was first introduced by *Luxury* or *Necessity*, is ^{contributes} not a very material Enquiry here: But if by such ^{to Dige-} *Dressing*, the parts of the Meat be render'd more ^{sion.} loose, and less coherent, it becomes thereby of easier *Digestion* in the *Stomach*: If otherwise, as in *Pickles*, *long salted*, and *dry'd Meats*; it becomes harder of *Digestion* for it, and generally of worse *Nourishment*.

Of all the things that Men eat, the *Horary* or ^{Early} *Summer Fruits* are of quickest *Solution*, if stript ^{Fruits,} of their Rinds, because the Body of 'em is more ^{and} soft and succulent, than that of other things we eat.

Next to these, in point of quick *Solution*, are ^{Sallad} the *Laeticinia* or the succulent *Sallad-Herbs*, ^{Herbs,} which abounding with heterogeneous Juices easily ferment with Heat. ^{why e fier} ^{of Dige-} ^{on than}

The last and longest of *Digestion*, of all the ^{Flesh:} kinds of *Foods* that CARNIVOROUS *Animals* ^{Whence} naturally seek, is *Flesh*, which tho' its Parts be ^{Roasting} both succulent and soft, yet are neither so juicy, ^{and Boyl-} nor so soft and loosely coherent, as either of these ^{ing, &c.} before mention'd. And perhaps, as well out of ^{intrean-} ^{ced.} *Necessity* as *Luxury*; Observation at first taught Men by *Roasting* and *Boyling*, and other kinds of *Dressing*,

Dressing, to loosen the *Compages*, and soften the Parts of what they were to eat. Yet many whole Countries, even to this Day, reject the whole Art of *Cookery*, and eat their Meat *raw*; and for any thing we can see, as much to the Advantage of their Health and Vigour, and perhaps as much to their *Luxury*.

Grain,
why by
Men ei-
ther con-
stantly
Ground
and Sift-
ed, or
Softned
by Steep-
ing.

Men do likewise eat *Grain*, and sometimes *Roots*: But these are always prepared when us'd as a constant sort of *Dyet*, as *Bread* is by grinding, fermenting, and baking, whereby the Substance of the *Grain* is not only broken very small, but the mixt *Mass*, made of it afterwards, is occasioned to cohere very loosely, and to contain a great deal of *Air*, which contributes to its future *Dissolution* in the *Stomach*. We do indeed use *Grain* divers other ways, besides in *Bread*, *Pies*, and *Puddings*, which have all something very analogous in their Preparation; but then we *Macerate* and *Soften* the *Grain* by previous *Boiling* or *Steeping*, and reduce it something nearer a State of *Fluor*, than it is found in the *Craw* of *Fowls*, which does the same Office, but need not carry it so far as our artificial Preparations do; because the *Gizzards* of *Fowls* being much stronger, and more *Musculous*, are consequently better able to grind it, especially by the Assistance of those *little Stones* or *Grains* of *Sand*, which they constantly swallow.

Indian
Bread
made of
Roots.

The *INDIANS*, many of 'em, use *ROOTS* instead of *Grain* to make their *Bread* of. But then even the rudest of them prepare it by some sort of *Maceration* and *Fermentation*, previous to their eating of it, that may reduce it to such a State as may give the *Stomach* least trouble in the *Dissolution* of it.

Marmou-
sets Squir-
rels, &c.
commi-
nute their
Food with
their Fore-
teeth.

Those *Animals* which are obliged by Nature to live upon Food somewhat harder than that of Men, yet have no *Ingluvies* to prepare and macerate

rate it for the *Stomach*, (such as *MARMOUSETS*, *SQUIRRELS*, *Rats*, *Field-Rats*, and *Mice*, that eat hard *wild Fruits*, *Nuts*, *Cheese*, *Roots*, &c.) are observed to nibble a long time with their *Incisores* or *Fore-teeth*, (which in those Creatures are very long, strong, and sharp) till they have exceedingly comminuted the Matters they eat, which are generally too hard for *Mastication* in these small Animals, and therefore they answer that end by gnawing that exceeding small with their *Fore-teeth* which they would not have Strength enough to break with *Grinders*.

Some have deny'd the *Fructus Horarii* and *La-Early* *eticinia* to be of easy Digestion, because they observe, that they frequently produce *Flatulencies*, *Gripings*, and other troublesome Symptoms. But this Objection springs from want of considering *why generally* *Digestion*, *Chylification*, and *Nutrition*, as distinct *thought to be of very bad Digestion*. Operations, which they confounding together, call that *hard of Digestion*, which does not yield much *Chyle*, or prove *good Nourishment*. It is true indeed of many of these sorts of *Fruits* and *Herbs*, that they are apt to raise Disorders in the *Stomach* and *Intestines*. But this Fault proceeds not from a Difficulty to be digested, but from too great a promptitude to it, and from the *fermentative* Disposition of the Juices which they yield, which will not let them remain long enough in the *Stomach* and *Intestines* to be subacted or qualify'd, by the mixture of other things there, for good *Chyle* and *Nourishment*. So that their *Crudity*, or unalter'd Simplicity of Appearance when they come away, proceeds from an *over-hasty*, not too *sluggish* Solution in the *Stomach*.

This generally is the State, and these the *Con-Quadru-* *pedes, that* *eat dry* *Meat,* *great Ma-* *sticators.* *ditions of Human Food*, before it comes into the *Mouth*. That of *other Animals* generally under- *Meat,* *great Ma-* *sticators.* goes no alteration, except it be that of *Domestick* *Animals*, which sometimes eat *dry Meat* (so call'd

in contra-distinction to that which is *Green*) which is harder of *Digestion* than the other; but these are generally very great *Masticators*, whether they have but one simple *Stomach* as *Horses*, or four as the *Ruminants* have.

Second
State of
the Ali-
ment.

Where
tending.

The *second State* of the *Aliment*, which we propos'd to consider, is that which is introduc'd in the *Mouth*, which depends almost wholly upon *Mastication*. It seems to have two ends: The first to bruise, and comminute the Mass, and render its *Cohesion* more lax, and thereby the Separation more easy in the *Stomach*: The other is to mix, and, as it were, to incorporate it with the *Saliva*, and so render it more apt to swell and ferment in the *Stomach*. For all *Liquors* containing some *Air*, are apt to rarify more or less in *Heat*, according to the Proportion they contain of it. But in my Opinion, the principal use of the *Saliva*, as well as of the *Juice* separated in the *Stomach*, is to facilitate the Mixture or Incorporation of the several *Fluids* of the *Meat* and *Drink*, after the Solution of the more solid part is accomplished, and to unite them under that *Lactescent Form* from which they are denominated *Chyle*.

Most con-
spicuous in
Rumi-
nants.

The first
Stomach
or Rumen.

This Alteration of the *Aliment* in the *Mouth*, is more considerable in, and necessary to *Ruminants*, and other *Animals* that feed upon dryer and harder *Food* than the *Carnivorous* do: And indeed, Mankind excepted, who enjoy it in no Proportion to them, it seems to be peculiar to that sort of *Animals*, and accordingly Nature has provided for it by a particular Organization, in giving them a *Plurality* of *Stomachs*; into the *first* of which, their *Food* is usually transmitted, without any other Alteration in the *Mouth*, than being a little rowl'd and wrap'd up together. This first *Stomach*, which is called the *Rumen*, is the largest of them, probably to contain as well the *Drink*,

Drink, as the whole crude Mass of their Aliment, which there lie and macerate together, and thence are transmitted again to the *Mouth*, to be *chew'd* and *comminuted* in order to their farther *Digestion* in the other *Ventricles*, in which use it perfectly answers the *Ingluvies* of *Fowls*.

This Use is incomparably illustrated by the Structure of the *Rumen*, or first Ventricle of *Camels*, in which are divers *Sacculi* that contain a considerable quantity of *Water*. This is an admirable Contrivance of *Providence*, to answer the Necessities of this Animal, which living in very dry desert Places, and feeding upon many sorts of hard dry Food, such as *Rice*, *Millet*, &c. would very often be in danger of Starving, even amidst the Plenty of *dry Meat*, which would not digest if they had not these *Reservatories* for *Water*, which oftentimes the Countries thro' which they march does not afford them in a long Tract of Ground. For if the *Water* which they drink, how large soever the quantity might be, were not kept apart in these Receptacles, it would pass off with the other Aliment upon the first discharge of the *Ventricle*, and they would not be able to sustain those long Journeys through dry Places, which all Accounts agree they do, for want of *digestible Food*.

These are all the Alterations that occur to me to be made in the *Mouth*, after which the Food is transmitt'd directly to the *Stomach* to be digested. This Operation we have already deny'd to be perform'd by a *Menstruum*, either separated in the *Stomach*, or convey'd thither from elsewhere, or by *Attrition* or *Simple Heat*: Tho' we do not deny this latter to contribute to, and promote *Digestion*, as it serves to actuate the Causes of Dissolution innate to the Aliment it self.

Principle
of Dissolu-
tion,
what.

We suppose then, all sorts of Aliment naturally to contain in them a *Principle of Dissolution*, (if I may be allow'd to use that Term) which after the *vital* and *vegetable Faculty* is extinct, begins to exert it self to the Dissolution or Destruction of the Subject, and consequently the *State of Decay* may be reckon'd to commence, whensoever the Accession of new Matter, or shifting of the Fluids (which in Plants as well as Animals we call *Circulation*) is at an end, though it does not always immediately shew it self in actual, visible Corruption, but proceeds by various Steps or Degrees, according as the Fluids, or containing Solids, are more or less disposed to *Activity* or *Resistance*.

The same
with that
of Vege-
table Life.

This *Principle of Corruption* is perhaps the same which in the State of *Circulation* and *Vegetation* was the *Principle of Life*, which being an *active Principle*, and now deny'd that *Passage* or *Vent* which it had before by the *progressive* or *circulatory Motion*, makes its way irregularly, and so destroys the Continuity of the *Solids* in which it is included, and introduces that Change in the Face of the whole Mass, which is call'd *Corruption*.

Air that
Principle.

The *Active Principle* (I here mean) is the AIR, which is mixed in considerable quantity with all sorts of *Fluids*, and is by Experience found as necessary to *Vegetable*, as *Animal Life*. This (tho' its Natural or Essential Motion, be *Expansive*, or *Quaquaversum*) being introduced into all Bodies, that have any kind of Life, mix'd with the *Fluids*, which make their Juices, has in them two kinds of Motion; one *Expansive*, by which it communicates that *Intestine Motion*, which all Juices have, and by which the containing parts are gradually extended, and grow; the other *Circulatory* or *Progressive*, which is not essential to it, but is occasion'd by the Renitency of the
solid

Has two
sorts of
Motion in
Animal
and Ve-
getable
Bodies.

solid parts of those Bodies, which obliges it to take that course which is most open and free, which is through the Vessels of *Animals* and *Plants*, which course being stopp'd, the *Expansive* still remains, and continues to act, till by degrees it has so far overcome the Resistance of the including Bodies, as to bring it self to an equal Degree of Expansion with the External Air; which it cannot do without destroying the Texture and Continuity, or *Specifick* degree of *State* of Cohesion of those *Solids*, which is that which is call'd a *State* of *Corruption*. Corruption, what.

For all Bodies, whether *Fluid* or *Solid*, that come within our certain Knowledge, are *Specifically* heavier, and consequently of a closer Texture than the Atmosphere, and cannot be reduced to a *Par* with it, *sine Interitu Subjecti*. All mixed Bodies Specifically heavier than the Atmosphere.

This *Expansive* or *Destructive* Quality of the AIR in these Bodies, may be two ways actuated, or promoted, either by weakning the *Tense* or *Cohesion* of the Parts of the including Body, and so facilitating the Work of the AIR; as it happens when Fruit is bruised, which will corrupt in that part much sooner than in that which is sound; or by intending the *Expansive* force of the *Air* it self, by *Heat*, or other co-operating Circumstances, and so helping it to overcome the Resistance the sooner. Corruption how accelerated.

Both these ways are used in many kinds of *A-Digestion* *nimal Digestion*: The first in Mastication, or the other *Analogous* already sufficiently spoken to: how performed.
The Second by the *Heat* of the *Stomach*, which forcibly rarifying the *Air*, enables it to rend the including Bodies sooner to pieces, and so to let loose the *Fluids*, and perhaps likewise so far to comminute several parts of the *Solid*, as to make them sustainable in the Liquor; which latter is the Operation that compleats *Digestion* in the Stomach.

Not so
soon dis-
solv'd by
a Greater
Heat of
Culinary
Fire.

The Expe-
dition de-
pends upon
the Medi-
um.

Roasting,
Boiling
and Stew-
ing, how
differenced
in point of
Celerity.

How in
Papin's
Digestor.

It may perhaps be objected, that the same Substances which the *Stomach* resolves so quickly into Particles, do by every day's Experience bear a much greater Heat of *culinary Fire*, and for a much longer time in the common Operations of *Cookery*, Roasting, Boiling, and Stewing, than the *Stomach* requires to resolve them into *Minima*.

To this Objection I answer, That this Degree of Expedition depends in great Measure upon the *Medium* in which it is perform'd. Thus, in *Roasting*, Meat will bear a much greater Heat than either in *Boiling* or *Stewing*, and the second way much fiercer and longer than in the latter: For as *Roasting* is perform'd in the *open Air*, as the Parts begin externally to warm, they extend and dilate, and so let out gradually part of the rarify'd included *Air*, by which means the Internal Succussions, on which this Dissolution depends, are very much weaken'd and abated. *Boiling* being perform'd in *Water*, the Pressure is greater, and consequently the Succussions to lift up the Weight, are proportionable in strength, and by this means the *Cottion* is hastned; and even in this way there are great differences; for the greater Weight of *Water* there is upon the Meat to be boil'd, the sooner it is done: And in *Stewing*, though the Heat be infinitely short of what is employ'd in the other ways of Dressing; the Operation is yet much more quick, because it is perform'd in a pretty close Vessel, and full, by which means the *Succussions* are more often repeated, and more strongly reverberated.

These are the common Observations of *Cooks*: But there is a way which yet more exactly resembles the Operation of the *Stomach*, which is by the *Digestor* invented by *Monfieur Papin*. In this the Meat is put together with so much *Water* as serves exactly to fill the Engine, which done, the Lid is screw'd on close, so as to admit of no external

external Air; and is, with two or three lighted Charcoal, or a single small Lamp Flame, reduced to a perfect Pulp, or rather a Liquor, in a very few Minutes, as in six, eight, ten, twelve or sixteen, according to the toughness of the Matter to be digested, or the Augmentation of this little Fire, which will, in a very short time, this way, dissolve the hardest Bones themselves. The strict closure of this Engine, so as to exclude the Intervention, or escape of Air, is the Occasion why the inward Succussions of the contain'd Matter, being equable and strong, resolve the whole into one seemingly *Homogeneous* Body, and mix the *Aqueous*, *Saline*, *Oleous*, and other Particles, so strongly together, as not to be easily at least separated, but while hot, to appear one Liquor, and when cold, an uniform Gelly, of a strength proportionate to the quantity of *Flesh* or *Bones* dissolved in the Water.

This Experiment holds great *Analogy* with the *Operation* of the *Stomach*, which though it does not ordinarily dissolve such hard Bodies, nor others so quick; yet according to the Degree of its Structure, and the Proportion of its Heat, it may be said to do the same thing. For as the *Stomach* naturally closes upon the Aliments that descend into it, so it strictly embraces its Contents when full, and by keeping out any Extraneous Air, fortifies and invigorates the Succussions of that, which is naturally contain'd in the *Aliment*, which it receives: Which, however little it may be, is thereby enabled to break, and resolve into small Particles, the Bodies which included it so mixed, *inter Minima*, with its Humours.

These, being thus reduc'd into *Fluor*, and intimately mix'd with the Liquids of the Drink, and Juices of the Stomach, compose that *Laetescens* *Liquor*, which is call'd *Chyle*, which is nothing

Chyle,
b w re-
cel'd in-
to the
Lacteals.

but a Mixture of *Oily* and *Aqueous* Parts, incorporated together with the *Saline*, and which, while it remains mix'd with the grosser parts in the Stomach, make a *thick, whitish, partly fluid Mass*, which we call the *Chyme*, which as soon as it is reduc'd to a Consistence, loose enough to be obedient to the Pressure and *Peristaltick* Motion, is gradually work'd out through the *Pylorus* into the *Duodenum*, along the sides of which, and the rest of the *Intestina Tenuia*, the *Vasa Lactea* are planted, into whose extreemly minute Orifices, the thinner and more Fluid part of this Mass, is press'd by the natural Contraction and *Peristaltick* Motion of the Guts, which is that *Chyle* of which the *Blood* is afterwards compos'd, and in Women that give Suck the *Milk* more immediately.

Appete,
b w
rais'd.

When all the *Chyme* and *Chyle* is press'd out, the *Stomach*, which follows the Motions of its Contents, is again by means of its Muscular Coat, reduced to a State of Contraction, and by that means the Inner is brought to lie in Folds, which touching, and by means of the *Peristaltick* Motion, rubbing lightly upon one another, produce the gentle Sense of *Fretting* or *Vellication* which we call *HUNGER*, which being felt first in the upper Orifice, which is first evacuated, begins therefore first to prompt us to replenish: But as by degrees the Remainder of the Contents are expell'd, this Friction or Rubbing of the Membranes upon each other, spreads gradually over the whole *Stomach*, and renders our *Hunger* more urgent and impatient, till by a new Repletion we take away the Cause.

This Hypothesis
not liable
to the Ob-
jections
which the
former
are.

This is all the *Fermentation*, and all the *Mentruum* that are required, to account for all the Natural *Phænomena* of *Hunger*, *Digestion*, and *Chylification*; and tho' they who admire Pompous Operose Proceedings, may think it too simple a

piece of *Mechanism* for such great Effects, yet it is more sufficient than any of those magnificent Ways, which any of the most luxuriant Fancies have been yet able to invent, and is incumbred with none of those Inconveniencies which have attended all the *Hypotheses* by different *Menstrua*, and *Fermentations* that I have yet met with: For when any of those sharp provoking Liquors, ^{Pricking} which they have imagin'd have (as in Morbid ^{Humours} Cases they sometimes do) affected the *Stomach*, ^{upon the} the *Appetite* has been always vitious, and the *a Disease* *Digestion* bad. For in such cases the Repletion with wholesome Food, not being sufficient to take off the Acrimony of such Humours, the *Fancy* has been upon the Hunt, as Sick *Fancies* generally are, for something out of the way, and perhaps extravagant and hurtful; and when such Humours are sent in Plenty upon the *Stomach*, they are by the Heat of the Part rarify'd into those Flatulencies, which are vulgarly call'd *Wind*, which by distending the *Stomach*, hinder ^{Desire} the Folds of the inward *Nervous Membrane* ^{Appetite} from approaching one another, and so destroy ^{and Di-} natural *Appetite*, as they do *Digestion* likewise, ^{gestion.} by hindering the *Stomach* from closing exactly upon the Aliments, and so obstructing it in its Office, which requires that Stricture.

The same way it is that hard Drinking de- ^{Why hard} stroy's *Appetite* and *Digestion*: For by keeping ^{Drinking} the *Stomach* constantly distended with Liquor, the ^{does the} Tone of it is destroy'd, and till it can be reco- ^{same.} vered again, they never return.

We might by the same way account for all the other Diseases of the *Stomach*, in which *Appetite* or *Digestion* are affected; but to do that, would take up more room than the Design of this Work allows, and this Chapter is already swell'd to too great a Bulk.

T A B. II.

F I G. I.

THE Cavity of the *Abdomen*, after its *Muscles* and *Peritoneum* are remov'd, and the *Stomach*, *Intestines* and *Mesentery* taken out, to shew as many of the rest of its *Viscera in Situ* as could well be express'd in one View; the *Skin* and *Fat* being taken off; the *External Muscles* appear on the *Head*, *Arms*, *Breast* and *Thighs*.

A, The Superior Convex surface of the *Liver*.

B, Its Inferior Concave surface.

C, The *Ligamentum Umbilicale* turn'd up on the Cartilaginous Endings of the *Ribs*.

a, The *Gall-Bladder* fill'd with *Gall*.

b, The *Ductus Cysticus*.

c, The *Ductus Hepaticus* joining with the *Cysticus*, and making the *Ductus communis*.

d, A Probe inserted into the *Ductus Pancreaticus*.

e, Another Probe in the same Orifice or Caruncle in the *Duodenum* g; inserted into the *Ductus communis Biliaris*.

f, The Body of the *Pancreas*.

g, A Portion of the *Duodenum* opened, to shew the exit of the *Biliary* and *Pancreatic Ducts*, as above at d, e.

h, The *Emulgent Vessels*

of the left Side, under which, near the great Artery at l, lies the *Receptaculum Chyli*, express'd Fig. III.

i i, The two *Kidnies*, of which the Right is somewhat lower than the Left.

k, The *Spleen*.

l, The descending Trunk of the *Great Artery*.

m, The ascending Trunk of the *Vena Cava*.

n n, The two *Spermatick Arteries*, springing from the Trunk of the Artery at l.

o o, The Two *Spermatick Veins*, the Right emptying itself into the *Vena Cava*, m; the Left, into the *Emulgent Vein* h.

p p, The *Spermatick Veins* and *Arteries* passing on the *Psoas Muscles* towards the *Testes*.

q q q, The two *Ureters* descending from the *Kidnies* to r.

r, The *Bladder of Urine* here blow'd up.

s, The *Urachus* turn'd down.

t t, The *Vasa Deferentia* passing from each Testicle to the *Vesicula Seminales*.

u u, The *Processes* of the *Peritoneum*, covering the *Spermatick Vessels* as they pass to the *Testes*.

w w, The *Testes*.

† †, The two *Cremaster Muscles*.

✕ ✕. The *Glandula Inguinales*.

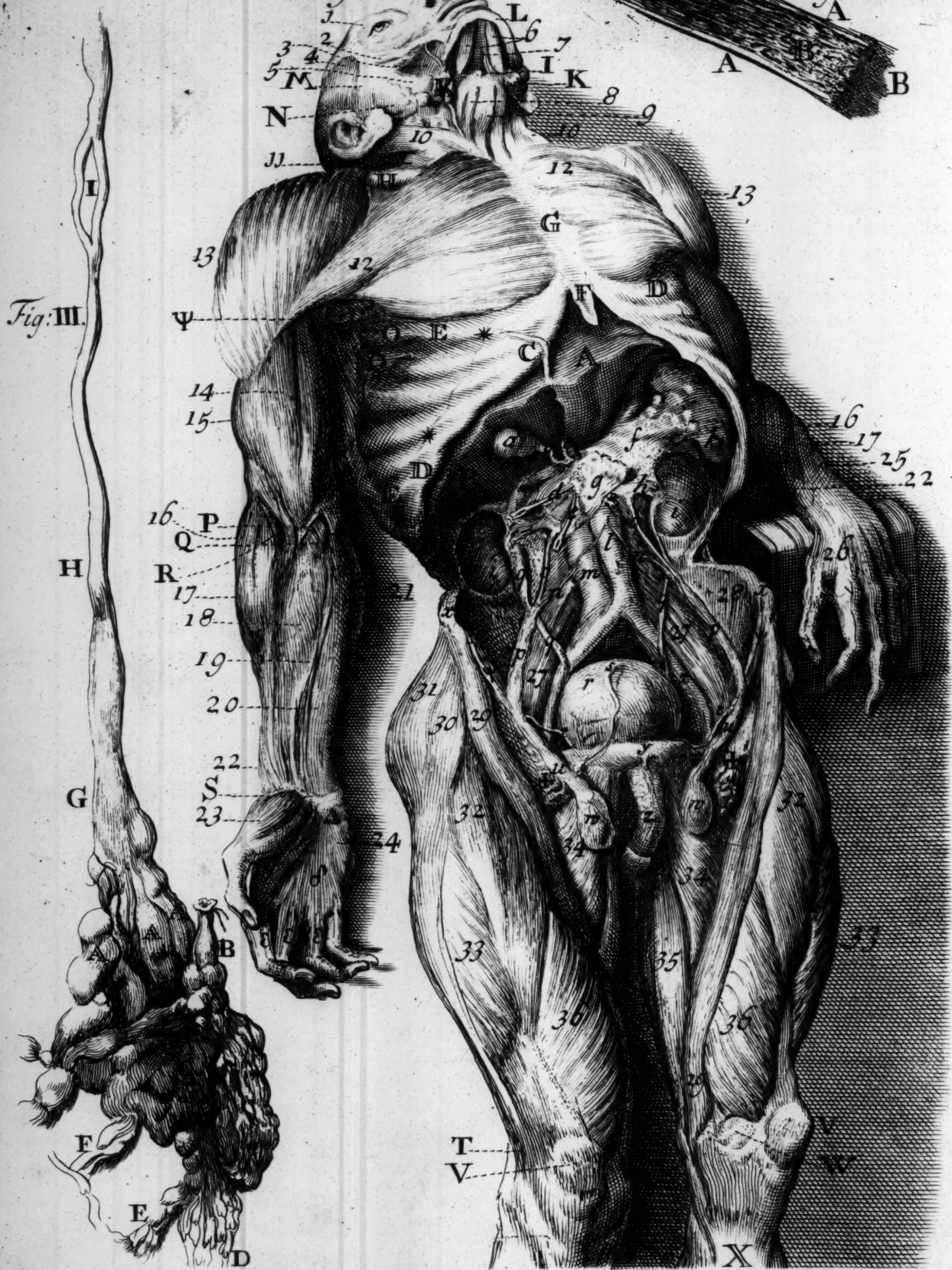
x x, The



Tab: II.

Fig: I.

pag 90
Fig: II.



xx, The *Spines* of the *Ossa Ilii*.

y, The *Os Pubis*, where the *Ligamentum Suspensorium Penis* springs, here express'd.

z, The *Dorsum Penis*.

DD, The *Cartilagineous* endings of the *Ribs*.

EE, The *Boney* parts of the *Ribs*.

* *, The Division that is commonly made between the *Cartilagineous* and *Boney* parts of the *Ribs*, to raise the *Sternum* F, G, in order to inspect the *Viscera* of the *Thorax*.

F, The *Ensisiform* *Cartilage*.

G, The *Sternum* or *Os Pectoris*.

H, Part of the *Clavicle* bared.

I, The fore part of the *Os Hyoides*.

K K, The *Glandula Maxilla inferioris*.

L, The inferior edge of the lower *Jaw-bone* bared.

M, The *Os Jugale*.

N, The *Parotid Gland*.

OO, Parts of the *Musculus Serratus Major Anticus*, that are indented with the *Obliquus descendens*.

P, The *Trunk* of the *Artery*, that is liable to be prick'd in letting *Blood* in the *Arm*.

Q, Part of the *Fascia Tendinea* that springs from the *Musculus Biceps*, and passes over the *Artery* P.

R, The *Trunk* of the *Nerve* appears also at the *Flexure* of the *Cubit*.

S, The *Ligamentum Annulare*, or *Transversale Carpi*,

by which the *Tendons* binding the *Fingers* are kept in, when their *Muscles* are in *Action*.

T, The *Tendon* of the *Musculus Membranosus*, near its *Insertion* to the *Tibia* and *Fibula*.

V V, The *Patella*.

W, The lower *Appendix* of the *Thigh-bone*.

X, The *Tibia*.

1. The *Musculus Orbicularis Palpebrarum*.

2. *Zygomaticus*.

3. *Buccinator*.

4. *Temporalis*.

5. *Masseter*.

6. Parts of the *Digastrick* *Muscles* at their *Terminations*.

7. Parts of the *Mylohyoideus* under the *Digastricks*.

8. Part of the *Coracohyoideus*.

9. *Sternohyoideus*.

10. 10. *Mastoideus* on both sides.

11. A small Portion of the *Levator Scapulae*.

12. The *Pectoral* *Muscles*.

13. The *Deltoides*.

ψ. Part of the *Coracobrachialis*.

14. The *Biceps Cubiti*.

15. Part of the *Brachialis internus*.

16. *Supinator Radii longus*.

17. Part of the *Radialis Extensor Carpi*.

18. *Radialis Flexor Carpi*.

19. *Palmaris Longus*.

20. *Flexor Digitorum perforatus*.

21. *Ulnaris Flexor Carpi*.

22. Part of the *Tendons* that extend the *Thumb*.

23. *Abductor Pollicis*; adjacent to which, towards the *Palm*,

Palm, lies the *Flexor secundæ Offis Pollicis*

24. *Abductor Minimi Digiti*; on which at Δ is placed the

(Δ) *Palmaris Brevis*.

δ , The Expansion of the *Palmaris longus* in the Palm.
 $\epsilon\epsilon$, The *Tendens* that bend the Fingers.

25. Part of the *Extensor Communis Digitorum* in the left Hand.

26. *Abductor Pollicis ad Dorsum Manus*.

27. 27. The *Psoæ Mus-*

cles, over which the *Spermatick Vessels* and *Ureters* pass.

28. *Musculus iliacus internus*.

29. *Sartorius* on both sides.

30. *Musculus Communis Membranosus*.

31. The *Gluteus Medius*, covered with the tendinous Expansion of the *Gluteus Maximus*.

32. *Rectus Femoris*.

33. 33. *Vastus externus*.

34 34. *Triceps*.

35. *Gracilis*.

36. *Vastus internus*.

F I G. II.

A Thin slice of the *Gall-Bladder* view'd with a Microscope, to shew its membranous structure, which is here distended and dry'd by blowing into its *Blood-Vessels*, whereby its *Parietes* became distended.

A A, The external and internal Membrane.

B B, Their Internal Membranous *Lamellæ*, framing a sort of Net-work by means of the *Air* insinuating into it. The like may be seen in the *Bladder of Urine*, or any Membranous part, if you insert a Blow-pipe between its *Lamellæ*,

or force Wind into its *Blood-Vessels*. It is by the same means *Butchers blow* up their *Veal*, either by forcing their Wind under the *Skin* near the *Navel* of the Creature, they afterwards drive it over the whole Body; or by *pricking* the *Skin* between the *Fore-Legs*, they suddenly pull the *Legs* from each other, and so let in the external Air. This Practice, though forbidden, is commonly done in this City, insomuch that you can hardly meet with a *Shoulder of Veal* without *Inflation*.

F I G. III.

THE *Receptaculum Chyli*, and part of the *Ductus Thoracicus*, fill'd with *Mercury*, and dry'd.

A A A, Three Trunks of

the *Receptaculum Chyli*. This Division of it has not been taken notice of by Anatomists, which makes me suspect the Descriptions we have

have hitherto had of it are from *Quadrupeds*, in whom, by reason of the Horizontal Position of this part, one *Receptacle* of *Chyle* may be sufficient. But in *Human Bodies*, its Position being *Perpendicular*, it seems necessary this *Receptacle* should be thus divided before it passes under the Trunk of the *Great Artery*, where it meets with repeated Compressions by means of the Pulsation of the *Artery*, which drives up the Contents of the *Thoracick Duct*.

B, One of the *Lacteal Vessels* ty'd up, by which the *Mercury* was injected.

C, The internal Surface of the Left *Lumbal Gland*, that lay on the Trunk of the *Artery* below the *Emulgents*.

D, The *Lymphæducts* of the inferior Parts, before they empty themselves into the *Lumbal Gland* C.

E F, *Communicant Branches* of *Lymphæducts*, between the *Right* and *Left Lumbal Glands*.

G, The *Ductus Thoracicus* above the *Diaphragm*, where it lies between the descending Trunk of the *Great Artery*, and *Vertebrae* of the *Thorax*.

H, About this part of the *Duct*, its *Valves* are very conspicuous, if you open it.

I, One of its Divisions (above which are divers others, that could not be express'd in this Page) whereby the Ascent of the *Chyle* may be the better carried on.

CHAP. XIV.

Of the PANCREAS.

THE PANCREAS is a conglomerate Gland, *Pancreas* situate near the first *Vertebrae* of the *Loins*, *Tab. II.* at the bottom of the *Stomach* on the hinder part *Fig. I. f.* of it, adhering, at its thicker Extreme, to the *Duodenum*, and from thence extended towards the Spleen.

It consists of innumerable small *Glands*, which *Its Substance.* though separately, being very firm, cohere but loosely together, and therefore make the whole Body of it seem lax. These *Glands* seem colligated as well by the *Vessels*, as by a *Membrane* proper to every one of them, and altogether are cloath'd with a very thin *Membrane* from the *Peritonæum*, which, if you blow into the *Excretory*

cretory Duct of the *Pancreas*, will let out the Air at several Places.

Colour.

Its Colour is what we in *English* usually call a *Flesh Colour*, *White*, somewhat discolour'd with *Red*.

Figure.

Vid. App.
Tab.
Blancard.
xxviii.

The Figure of it is somewhat like to that of a *Dog's Tongue*, but longer, being usually about eight or nine Fingers breadth long, and about two, or two and an half broad, and about one thick. Its Weight, according to Dr. *Wharton* and *De Graaf*, is about four or five Ounces.

Vessels.

Its Arteries come from the *Celiac*, both *Right* and *Left*. Its Veins go to the *Porta*. The Nerves come from the *Hepatick Plexus*, which is form'd under the *Liver* of some Branches of the *Intercostals*.

Excretory
Duct.

It has a peculiar Duct, first discover'd by *Wirsungius*, and therefore call'd by his Name *Ductus Wirsungianus*. This Duct is about the bigness of a *Raven's Quill* near the *Intestine*, tho' more slender in parts remoter from it. It is ordinarily accounted and described as a single Duct: But *De Graaf* takes notice that he has seen it double sometimes in Men, and says, it is generally so in *Pheasants*, and many other *Fowls*: And it has happen'd to be so in most, if not all the human Bodies, and Dogs, that I have examin'd about it, since I took notice of that Suggestion.

Frequently
double.

Oficula.

It empties it self into the *Duodenum* generally by two several Mouths: One only of which is taken notice of by Anatomists, and opens it self four or five Fingers breadth below the *Pylorus*; and not seldom at the same *Foramen* with the *Ductus Communis Choledochus*. The other is somewhat lower, but at an uncertain distance. It has no *Papilla*, and is much smaller than the other, but is easily discover'd by blowing into the larger.

Tab. II.
Fig. I. d.

C H A P. XV.

Of the SPLEEN.

THE SPLEEN is a soft spongy *Viscus*, ap- Spleen.
 pearing externally of a darkish discolour'd
 red, or rather bluish Colour. Its *Figure* some- Colour.
 what approaching to that of a Tongue, though Figure
 in that particular the Appearance is not very con- uncertain,
 stant, it being sometimes triangular, sometimes as the
 almost round. Perhaps Authors have generally Number
 describ'd its Figure from the *Spleen* of Brutes, also.
 which has in most of them a nearer resemblance Vid. App.
 to a Tongue than the *Human* has. From such Tab.
 likewise the Figures of *Blancard*, here referr'd Blancard.
 to, seem to be drawn. Neither is the Number xxx.
 absolutely certain; though generally we find but Fig. I.
 one, yet sometimes two, and sometimes three Fig. II.
 have been seen in the same subject, as divers *Ana-*
tomists aver.

It is situated in the left *Hypochondrium*, be- Situation
 tween the *spurious Ribs* and the *Stomach*: A lit-
 tle Convex on the Surface towards the former,
 and Concave next to the *Stomach*.

Its Magnitude is so very various, that it is Magni-
 not precisely determinable: However, the ordi- tude.
 nary length assign'd is about six Inches long,
 three broad, and one thick.

It is connected by the *Omentum*, and by the Connexion.
 means of that, and the *Blood-Vessels* to the *Sto-*
mach, and *left Kidney*, and sometimes the upper
 part of it adheres to the *Diaphragm*.

It is cover'd with two *Tunics*, of which the Coats.
 External is deriv'd from the *Peritonæum*, but na-
 turally is so very thin, and liable to tear in Dis-
 section, as requires the *Anatomist* to handle it ve-
 ry gently. In some morbid Bodies it is very firm
 and

*Exterior
Coat.*

and thick, in others it becomes *Cartilaginous* and *Boney*: It is join'd to the *inner* and *proper Membrane*, only by the Intervention of the *Blood-Vessels*, whence it happens, that, upon the Separation of them, there appear upon the Surface of the *inner Membrane* little black or bloody points, shewing where these *Vessels* were broken off: Thro' these *Holes* or *Orifices* it is that the *Air* escapes, upon attempting to blow up the *Spleen* by the *Artery* or *Vein*, after this *outer Membrane* is separated from it; which Experiment generally succeeds in *Quadrupeds*, whilst this *Membrane* is left on. For if this *Membrane* be entire, when the *Spleen* is taken out, it may be blown up by any of its *Blood-Vessels*, or have its *Lymphaticks* fill'd with *Mercury*, if all the *Vessels* be carefully tied, except those you blow or pour into.

*Interior
Coat.*

The *Inner Tunic* consists of *Fibres* very curiously interwoven, from which it sends over innumerable *Threads* from one side to the other.

Cells.

From this *Coat*, very probably, are derived those innumerable *Cells*, or little *Bladders*, which make up the main *Bulk* of the *Spleen*. Though *Malpighius* rather thinks them to arise from the *Venous Duct*; a difference not very material. These *Cells* are for *Number*, *Figure*, and *Magnitude*, various and indeterminate, and best shewn by blowing up the *Spleen* through the *Trunk* of the *Vein*, and then laying a *Varnish* upon it, and drying it in the open *Air*, after which cutting it, the *Cells* remaining distended, shew their *Figure* and *Capacity*. These *Cells* communicate with one another, and exonerate themselves into the *Trunk* of the *Vein*.

*How
shewn.*

*Glands of
Malpighius.*

The inside of these *Cells* is furnished with divers *Glands*, according to *Malpighius*, which adhering to one another, six, seven, eight, or more together, form a sort of small *conglomerate Glands*, in which the *Arteries* and *Nerves* seem to terminate.

nate. Their Existence is however very questionable, as not appearing plainly here, nor in the *Penis* at all, whose Structure is the same, but by no body said to be Glandulous.

Its *Arteries* come from a large Trunk of the *Blood-Vessels* *Cœliack*, and are contorted in their Progress to the *Spleen*: The *Veins* go to the left Branch of the *Porta*, and are call'd from the *Viscus*, the *Splenic Artery* and *Vein*. These Blood-Vessels are in respect to the Bulk of the *Viscus* very large, and manifestly communicate with each other. For whether you pour Water into the *Artery* or *Vein*, it presently discharges it self promiscuously by either; so that here is no sign of any *Valve*, nor indeed through the whole *Porta*, whatever some have told us.

Its *Nerves* come from the *Plexus*, call'd by *Nerves*. *Willis Plexus Lienaris*, which lies near the bottom of the *Stomach* on the left side. All these Vessels, as soon as they enter the *Spleen*, are wrapt up in one common *Capsula* or *Membrane*, and are plentifully distributed through the whole Substance of the *Spleen*, the *Nerves* every where accompanying the *Arteries*, and circling them variously about. Of the *Vein* within the *Spleen* there are divers Branches or Trunks, which on all sides, as well towards the Substance of the *Spleen* as the *Arteries*, are punch'd through with many little *Holes*.

The *Spleen* abounds with *Lymphæducts*, in Lymphaticks. proportion to its Magnitude equally, if not more than any part of the Body: But these do not so plainly appear, unless in live Dissections, with a Ligature upon the Vessels, or on blowing into the Veins.

The *Anastomoses* between the *Arteries* and *Veins* of the *Spleen*, have been already observ'd of the *Easy Preparation of the Spleen by Mercury*. to be more plain in this *Viscus* than any other part of the Body, which will yet more fully appear,

pear, if *Mercury* be poured into either *Vein* or *Artery*. For it indifferently fills both from either; and if the *Spleen* be hung up so fill'd, with the *Vessels* tied for three *Weeks* or a *Month*, and then cut, it exhibits them all in their proper *Figures* and *Dimensions*.

Spleen receives a greater Proportion of Blood than any other part.

By the *Diameter* of the *Arteries* and *Veins* thus exhibited, as well as from the *Capacity* of the *Trunk* of the *Splenic Artery*, which equals that of both the *Mesenterick Arteries*, this *Viscus* appears to be evidently furnish'd with a greater proportion of *Blood* than any other in the *Body*.

Ingenious Conjecture of Mr. Cowper, concerning the Use of the Spleen.

MR. COWPER from hence, and from the manifest immediate *Communication* between the *Arteries* and *Veins* in this *Part*, draws a very natural *Conjecture* of the *Use* of this *Viscus*, at least of this peculiar *Mechanism*. He imagines it to be a subordinate circulatory *Organ*, and that, by this *Congress* of the *Arterial* and *Venous* *Blood* here, an *Impetus* is communicated to the latter, by which its *Progress* through the *Ramifications* of the *Porta* to the *Cava* is promoted, which otherwise would be so broken by the double *Ramifications* of the *Porta*, as to want *Strength* sufficient to carry it to the *Heart*. This *Hypothesis*, deriv'd purely from the *Mechanism* of the *Part*, carries a *Face* of great *Probability*, and deserves to be consider'd by all the *Learned* and *Judicious*. But whether it be the *sole* or *ultimate Use* of the *Viscus*, I ask leave still to doubt.

Other Use uncertain.

Many other *Hypotheses* have been offered concerning the *Use* of this *Viscus*, but none of them so satisfactory to me as to induce me to amuse the *Reader* about any of them; and therefore I shall leave it to farther *Enquiry*, intending myself to prosecute, at more leisure, some *Suspensions* which I have entertain'd concerning it, which I think not yet sufficiently confirm'd, to offer them to the *Publick*.

C H A P.

C H A P. XVI.

Of the LIVER, GALL-BLADDER, and DUCTS.

THE LIVER is a large Glandulous Viscus, of ^{Liver, its} a red bloodyish Colour, situated immediately ^{Descrip-} under the Diaphragm, in the right Hypochondri- ^{tion.} um, which it almost fills, and thence stretching it ^{its Situa-} self over the right side of the Stomach, towards ^{tion.} the left Hypochondrium, reaches beyond the Car- ^{Tab. II.} tilago Ensiformis, growing gradually thinner and ^{Fig. I.} narrower. ^{A. B.}

The upper part of it is *Convex*, and perfectly ^{Surface} smooth or polish'd: The under ^{Concave,} *Concave*, and ^{Concave,} somewhat more uneven, having four large ^{Convex.} *Fissures*, ^{Fissures.} one through which the *Umbilical Ligament*, or *Rope*, passes; a second on the left side, receiving the *Pylorus*, and the beginning of the *Duodenum*; a third on the right side, near the *Marginal*, in which the *Gall-Bladder* is lodged; and the last in the upper part, affording a Passage to the *Vena Cava*.

The *Figure* of it is somewhat approaching to ^{Figure.} round, with thin edges, not altogether even, but notch'd in some Places. Its ^{Magni-} Magnitude is vari- ^{tude.} ous in different Subjects, according to the Pro- portion of the Body, though in a *Fœtus*, or a very young Animal, it is always proportionably much larger than in Adults, in which *Dr. Glisson* reckons the ordinary length of it to be equal to that of the *Arm*, from the *Elbow* to the *Wrist*, measuring it by the *Concave* Surface, which is much the shortest, and differs from the *Convex* about as much as the String does from a Bow moderately bent. The same *Author* computes the *Breadth* to equal the *Length* of the *Hand*.

In some
Brutes di-
vided into
Lobes.

S. me-
tim s in
Men.

Connexion
by the

Ligamen-
tum Sul-
penfori-
um.

Two other
Liga-
ments.

And the
Blood-
Vessels.

Motion
depending
on the
Dia-
phragm.

First Tu-
nic, or
Common
Mem-
brane.

Subst. ce.

In *Dogs*, and divers other Animals, it is divid-
ed into several distinct *Lobes*; but in Men it is
generally one continued Body, having one small
Protuberance, which is accounted (by many) a lit-
tle *Lobe*. Yet it has been sometimes observ'd to
have been divided into two or three *Lobes*.

It is connected to divers Parts, but especially
to the *Diaphragm*, to which it is fastned by a
broad, thin, but strong semi-circular Ligament,
call'd its *Suspensory* Ligament, and derived, accor-
ding to Dr. *Glisson*, from the common *Capsula*
of the *Porta* and *Gall-Ducts*. The Continuity of
this Ligament, being interrupted by the Perfora-
tion of the *Vena Cava*, has given occasion to
some Anatomists to divide it into two. It is like-
wise by another strong Ligament, which has its
Origin from the external Coat of the *Liver*, or,
which is all one, from the *Peritoneum*, ty'd to
the *Cartilago Xyphoides*. And by a third, which
is form'd out of the *Umbilical* Vessels, which in
Adults dry up and become a Ligament, it is con-
nected to the Tendons of the *Abdominal* Muscles
in the *Linea Alba* at the *Navel*. These several
Ligaments serve to keep it in its due Situation;
besides which, it has other Connexions by the
Blood-Vessels, which need not be mentioned
under this Head.

The Liver has a Motion, though not proper to
it self, but depending on that of the *Diaphragm*, to
which being so firmly connected, it must of necessity
obey its Motion, and in *Expiration* be drawn up;
and in *Inspiration*, when that is contracted, and
approaches towards a Plane, be let down again.

It is cover'd with a thin smooth *Membrane*,
deriv'd from the *Peritoneum*, which is to be se-
parated from the Substance of the Liver, though
not without some Danger of Laceration.

Its Substance is *Vascular* and *Glandulous*, which
latter part of it is very soft and fryable, and pret-
ty

ty easily scrap'd off from the Vessels, to which the *Glands* every where adhere as it were in Bunches; which has made Anatomists call the considerable ones the *Internal Lobes* of the *Liver*. *Internal Lobules.*

The *Glands* adhering thus to the Vessels, and constituting those *Lobes*, are wrapp'd up together in proper *Membranes*, whence this appearance of distinct *lobes*. Every one of these *Glands*, according to the Observation of *Malpighius*, is composed of six unequal Sides or Faces, which are better to be seen in *Fishes*, and some other of those Animals which are call'd imperfect, than in *Men* or *Animals* of a larger Kind. *Proper Membrane constituting the Internal Lobes. Figure of the Glands.*

These *Glands* are each of them cloath'd with their proper *Membrane*, and have each an *Excretory Duct*, several of which joining together, form little Trunks, which run all along with the Branches of the *Porta*, and these again uniting, form longer Trunks, which are always found full of *Bile*, and make the *Porus Bilarius*, which being distributed all over the *Liver*, receives in the manner foregoing the *Bile*, which is separated by these *Glands*, and terminating in the *Meatus Hepaticus*, and that in the *Ductus Communis*, at length discharges the *Bile* into the *Duodenum*. *Peculiar Membrane Excretory Ducts. Porus Bilarius.*

Besides this discharge, which is suppos'd to be the great one, it likewise delivers part of its *Bile* into the *Gall-Bladder*, by a *Duct* pretended to be discover'd first by *Monfieur Perrault*, and by him call'd *Ductus Cyst-hepaticus*, though long before describ'd by *Dr. Glisson*, but in one respect defectively, in that he does not take notice of any immediate Communication between the *Porus Bilarius* and the *Gall-Bladder*, by means of that *Duct*. *Verheyen*, according to the course of the *Bile* through that *Duct*, from the *Porus Bilarius*, reverses the former Name, and more properly calls it *Hepaticysticus*, and asserts the right of *Dr. Glisson* to the Discovery, which perhaps the Doctor *Cyst Hepatic Ducts. First describ'd by Dr. Glisson.*

App. had otherwise lost, for want of dignifying it
 Tab xxix. with a distinct Name; for he barely calls it a
 Fig. 4. Trunk.
 C C C.

H H H. The way to discover this Duct, is to tye the
 Experi- Meatus Cysticus, and then to blow strongly into
 ment dis- the Ductus Communis, by which means the Air
 covering the Cyst- will come round by this Duct into the Gall-Blad-
 der, which will be thereby blown up: And if
 Hepatic afterwards the Bladder, and the Meatus Cysticus,
 Duct. from the Ligature upwards, be laid open, the
 Blast will be observ'd to penetrate not only into
 the Bladder, but likewise into the Meatus it self,
 by several little Apertures. This Experiment I
 have not yet had opportunity to try in a Man,
 but in an Ox-Liver it succeeded so, as to convince
 us, that even in an Ox, this Duct had not been
 sufficiently describ'd.

Observa- Verheyen, in the Prosecution of this Discovery,
 tions of has observ'd in the Gall-Bladder of an Ox, not
 Verhey- only one, but three Orifices opening into it, by
 en, con- blowing into each of which, the Flatus penetra-
 cerning this Duct. ted the Ductus Hepaticus, and offering to trace
 Vid. App. them, he found that two of them join'd toge-
 Tab xxix. ther before they reach'd the Hepatick Duct, and
 Fig. 2. H. enter'd into it with a single Stem and Orifice:
 k k. iii. The other he observ'd to be join'd just at its
 Orifice into the Gall-Bladder by another Duct,
 whose Roots were dispers'd through the Sub-
 stance of the Liver. In another Subject the
 same Author says, He discover'd four Hepaticy-
 stick Ducts, through each of which he blew into
 the Gall-Bladder. In farther Proof of this Dis-
 covery, he examin'd the Gall-Bladder of divers
 Oxen, and never fail'd of finding one or two such
 Orifices opening into the Vesicula Fellis.

Dr. Brant- These Observations of this Inquisitive Anato-
 thwait's mist, are confirm'd by an Experiment which
 Experi- was made before divers of us, by that Ingenious
 ment and Discovery. Learned Gentleman Dr. Branthwait, (when he
 prepar'd

prepar'd a Body for his Lecture on this *Viscus*, in the Theatre of the College, before the whole Society) who by blowing into the *Porus Bilarius*, after having open'd the *Gall-Bladder*, shew'd us the Wind issuing at a great many Orifices, which gives us occasion to think, that if these Ducts were carefully trac'd, they would be found to come from every considerable Branch of the *Porus Bilarius*.

One of these Ducts the forementioned curious ^{One of} Author gives us a Description of, through the ^{these} whole Tract of it, which, till Autopsy shall bet- ^{Ducts de-} ter inform us about the rest, may serve to give ^{scribed} us an Idea of them all. It runs from the *Porus* ^{from Ver-} *Bilarius* to the *Vesicula Fellis*, in length about eight Inches, and is about the thickness of a small Straw, but somewhat thicker near the *Gall-Bladder*, where it is join'd just at the Insertion by another Duct, the Roots of which are disseminated through the Substance of the Liver. In its Course it receives divers *Tubuli*, or little *Gall-Ducts*, from the Glands of the Liver, most of which are inserted so as to point towards the *Vesicula Fellis*; though some about the Extremity nearest to the *Hepatick Duct*, point towards that, from which Contrivance the Author argues reasonably enough, that probably when the *Gall-Bladder* is so full, as not to admit of any more, they discharge themselves into the *Hepatick Duct*, though their ordinary Course be to the *Bladder*: Which is farther confirm'd by the Experiment of Blowing into the *Porus Bilarius*, which easily fills the *Gall-Bladder*, though the same Flatus cannot, by any Compression, be made to return that way to the *Porus Bilarius* again: Yet if the end of a *Blow-Pipe* be put into the Orifice at the *Bladder*, the Flatus pierces readily to the *Hepatick Duct*, which shews that the sole Obstacle is the *Oblique Insertion*, or *Valves*, of the Mouth

of these *Ducts*; and that in the Channel, the *Flatus*, and consequently the *Bile*, moves indifferently either way.

Oblique
Insertion
of this
Duct.

This *Duct* is inserted obliquely into the *Vesicula Fellea*, and running a little way between its Membranes, discharges it self into it about three Inches above the Neck, after the same manner as the *Ureters* do into the *Urinary Bladder*.

Porus Bi-
larius, or
Hepatic
Duct.

The PORUS BILARIUS, or HEPATICK DUCT, which is the most considerable of all the *Biliary Ducts*, is form'd after the manner of a *Vein*, from the Concurrence of infinite small Ramifications springing from *Glands*, which united, make up divers Trunks, equal in Magnitude to the Branches of the *Hepatick Arteries*, which accompany them, Branch for Branch, through the whole Substance of the *Liver*, and are wrapp'd up in the same *Capsula* with the *Porta*: These Branches are about the size of a Wheat-straw, but the largest of these are sometimes so stretched, as to be big enough to admit a Man's little Finger, and are distinguishable from the Ramifications of the *Porta*, chiefly by their Contents. Besides the *Capsula* which is common to that and the *Porta*, it has a thick white proper Coat, like the *Musculous* one of an *Artery*. On the Concave side of the *Liver*, the several Ramifications

App.
Tab.xxix.
Fig. 2.
a a a.
Capacity
of its
Branches.

Its Trunk.

meet and form one Trunk or Channel, which is call'd more peculiarly the *Hepatick Duct*, about the bigness of a *Goose-Quill*, which descending about two Inches, meets with the *Cystick Duct*, and together with it, forms that which is call'd the *Ductus Communis*, which descending in a right Line about four Inches, farther discharges it self into the *Duodenum*, by an oblique Insertion oftentimes at the same Aperture with the *Pancreatick Duct*.

Its Ori-
fice.

Gall-
Bladder.

App.
Tab.xxix.
Fig. 4.
E. A.

The GALL-BLADDER is a *Membranous Receptacle* in Figure somewhat like a *Pear*, situated at the

the lower Margin of the Liver on the Concave side : It is about the bigness of a Pullet's Egg. It ad-heres to the Liver, not only by its Vessels which it receives from it, but likewise by its Membranes, the External or Common being the same with that of the Liver, and is a good part of its Substance, as it were immers'd in the Liver : The lower part which hangs out of the Liver, rests upon the Pylorus of the Stomach or Colon, which it dyes Yellow by those parts of Gall which transude through its Membranes.

Its Membranes are reckon'd five, an outer or common one from the *Peritonæum*, an inner one on that side which adheres to the Liver from the Capsula of the Porta, and of the *Porus Bilarius*, besides three Proper.

The Exterior of the Proper Membranes, consists of a great Number of white Fibres, irregularly interwoven with a great Number of Vessels, upon the account of which it is call'd the VASCULOUS Coat.

The Second consists of a sort of fleshy Fibres of a double Order, and therefore it is called the MUSCULAR Coat. The first Order of these Fibres is *Longitudinal*, but somewhat irregularly disposed: The Second are *Annular*, but alike irregular with the former, often intersecting one another, as the former do, at very acute Angles.

The Third or Inner Coat, which is very much wrinkled, consists of a great Number of Glands, like the *Crusta Villosa* of the Stomach, and is therefore properly call'd its Glandulous Coat: It separates a *Mucus*, which, lining all the inside of this Bladder, serves to defend it from the extream Acrimony of the Bile, which is in this part abundantly thinner, and much more Acrimonious, than in the *Porus Bilarius*.

Thus

Thus the *Tunics* of the *Gall-Bladder* are described by some, who are Nice in distinguishing Membranes. But to us, assisted by the Microscope upon a piece of a *Gall-Bladder* dry'd, the reason of this accurate Distinction did not appear. But on the other hand, these several Orders of *Fibres*, before described, seem'd to be only an infinite Perplexity of Vessels diversly ramify'd, with some *Fibres*, perhaps disorderly mixed, which, when the Subject is dry, are not easily to be distinguished.

Vide
Tab. II.
Fig. II.

Fundus.
Collum.

Sphin-
cter.

Meatus
Cysticus.
App.
Tab. xxix.
Fig. 4.
G G.

Vena
Porta con-
trary to
all other
Veins,
shoots from
a Trunk
into Bran-
ches like
an Artery.
Ibid.
Fig. 2. B.
ccc.
Fig. 4. I.
Trunk of
the Porta
but short.

The *Bladder* has been divided into two parts, the *Fundus* or *Bottom*, and the *Collum* or *Neck*. At the Orifice of which latter is placed a *Ring*, or *Circle*, of pretty strong *Muscular Fibres*, which serve as a *Sphincter* to constrict the Orifice of the *Gall-Bladder*, and hinder the too liberal discharge of the *Bile*.

Just below these *Fibres*, which by some have been mistaken for a *Valve*, is continu'd another *Biliary Duct*, call'd *Meatus Cysticus*, which is about the bigness of a Goose-Quill, and at about two Inches distance from the *Gall-Bladder* is join'd to the *Meatus Hepaticus*, which together form the *Ductus Communis* before-mention'd.

Besides these *Gall-Vessels*, which are peculiar to the *Liver*, it abounds with *Blood-Vessels*, especially *Veins*, of which the *Porta* and *Cava* are diffeminated through the whole Substance of it: And here it is particularly remarkable of the *Porta*, that after the manner of *Arteries*, it shoots it self from a *Trunk* into *Branches*, and being at last lost in *Capillaries*, it delivers the Blood into the *Cava*, by which it is immediately re-convey'd to the *Heart*.

The *Porta* is form'd out of the Concurrence of divers *Veins*, which meeting together make one of the most considerable *Venous Trunks* of the Body, as to its Bulk, though contrary to the Course

Porta receives the Blood from most of the *Viscera* of the *Abdomen*, and, after the Coalescence of its Branches, enters the *Liver* in a *Trunk*, immediately under the Surface whereof, having first form'd a kind of *Sinus*, it is divided into two principal Branches, and those again into five, which scatter innumerable Ramifications through the whole Substance of the *Liver*. The several larger Branches are, together with the Branches of the *Porus Biliaris*, wrapp'd up in a common *Capsula* or Membrane already described.

Branches
of the
Cava in
the Liver,
improperly
so call'd.

The Blood which is convey'd into the *Liver* by the *Porta*, after the manner of the *Artery*, is received again, after having been purged of its Bile in the Glands of the *Liver*, into innumerable *Veins*, which empty themselves into the *Cava*, and are vulgarly, though improperly, call'd Branches of the *Cava*, but ought indeed to be esteem'd the proper Blood-Vessels of the *Liver*, as the *Emulgents* are of the *Kidnies*, and which do as all others, except the *Pulmonary Vein*, exonerate themselves into the *Cava*, the common Channel by which the Blood returns to the *Heart*.

Hepatic.
Arteries.
App.
Tab. xxix.
Fig. 1.
I. L.

The *Arteries* which are call'd the *Hepatic*, come from the Right Branch of the *Cœliack*. The Learned Dr. *Glisson* thinks, that the *Porta* does so much the Office of an *Artery*, that no more are necessary than those only which minister Nourishment to the Membranes and *Capsula*: Tho' I cannot but think that they serve for the Nourishment of the whole Part, and perhaps for other Uses.

General
Mistake of
Anatomists
concerning
these
Arteries.

Anatomists, having generally form'd their Ideas of the *Hepatic Arteries*, from the Dissection of the *Livers* of *Quadrupeds*, (especially *Horses* and *Oxen*) have represented them much less, than really they are in *Human Bodies*, because they have found them so in those Subjects, and have concluded

concluded them proportionally less in *Human*; whereas they are in Fact much bigger, as appears by several Preparations, which are to be seen at Mr. *Cowper's*, in which the Stem of each *Hepatic Artery* is as large as a Goose-Quill, and the Branches in the *Liver* are every where equal in Magnitude to those of the *Porus Bilarius*, which they accompany. Perhaps in *Human Bodies* in this *Viscus* a larger *Stream*, and directer *Impetus* ^{Why larger in Human} of *Arterious Blood* is requir'd to drive on the *Venous*, because of the *Erect* Posture, than in ^{Bodies, than in} Animals of an *Horizontal* Position of Body. For ^{Horses, and greater Ani-} which reason *Horses*, &c. though of much larger Size, and having much bigger *Livers*, have ^{mals.} these *Arteries* much smaller than *Men*, and not only so, but curl'd like the Tendrels of a Vine, to break the *Impetus*, which in that Posture is not so necessary, as in the *Erect*.

These sorts of Differences in the Mechanism ^{Deside-} of *Animals*, upon the Score of the Position of ^{ratum in} their Bodies, occur so often, that it would be ^{Anatomy.} no mean Service to *Anatomy*, and the *Oeconomical* History of *Animals*, if any one, who had Opportunity and Ability, would give us a History of those Variations of the Parts of *Animals*, which spring from the different Postures of their Bodies.

The *Nerves* come from the *Plexus*, call'd by *Nerves*. Dr. *Willis* the *Hepatic Plexus*, form'd on the right *Hypochondrium* by the Branches of the *Intercoastal*, which wrapping themselves about the *Arteries*, make a sort of a Net-work, and after spreading themselves upon the Membrane and Surface, disappear.

The *Lymphæducts* are numerous, but not easily ^{Lymphæ-} observed in a *Human Subject*, for want of Live ^{ducts.} Dissections, or at least whilst the Subject is warm, ^{App.} but in other Animals, which may be dissected a- ^{Tab. xxix.} live, if a Ligature be laid upon the *Porta* and the ^{Fig. 1.} *Bilary* ^{Q Q.} ^{R R.}

Biliary Ducts, they become very conspicuous. But, by blowing into the *Arteries* or *Gall-Ducts*, they may be made visible, and appear very numerous on the *Concave Surface* of the *Liver*, where they run to a *Lymphatick Gland*, from which the *Exporting Lymphæducts* arise, and empty themselves into the *Receptaculum Chyli*.

CHAP. XVII.

Of the Kidnies, and Glandulæ Renales.

Vide
Tab. II.
Fig. I. ii,
Kidnies.
Situation
on each
side.
Figure.
Magni-
tude.

Exterior
or Adipose
Mem-
brane.

Interior
Mem-
brane.

Connexion.

THE KIDNIES are situated on each side, the Right between the *Liver* and *Musculus Lumbaris*, on the right side; the Left between the *Spleen* and the same Muscle on that side; only the Right is somewhat lower in Men than the Left: Though in *Brutes* it is generally the contrary. It is in *Figure* pretty like a *Bean*, but not quite so flat. They are in Men commonly about five Inches long, and three broad, and about one and an half thick.

They lie between the *Duplicature* of the *Pelitoneum*, which affords them their *Exterior Membrane*, which, in Persons not emaciated, generally abounds with *Fat*; whence it has by some been call'd *Tunica Adiposa*. This Membrane envelops them but loosely, and in *Fat Persons* is swell'd by the *Fat* to a very considerable thickness; but not so much as in *Quadrupeds*, because the *Horizontal Position* of their *Bodies* leaves a greater space between their *Intestines*, and these Parts in which their *Fat* abounds.

The *Interior Membrane* arises from the *Exterior* of the *Blood-Vessels*, and adheres pretty closely, yet not so as not to be easily separable.

By their external Membrane they are connected to the *Loins*, by their *Blood-Vessels* to the *Aorta*

Aorta and *Cava*, and by the *Ureter* to the *Bladder of Urine*: The *Right* is likewise sometimes connected to the *Intestinum Cæcum*, and sometimes to the *Liver*; the *Left* to the *Colon* and *Spleen*.

The *Substance* of them is made up of *Glands Exterior* and *Vessels* of several kinds, the *Exterior* part of *Substance*. which carries a very different Face from the *Interior*: The *Exterior* consisting mostly of *Glands*, and very fine *Ramifications* of the *Blood-Vessels*, which latter shooting their *Branches* round, like *Lines* drawn from a *Centre*, form divers little elegant *Star-like Figures*, which cutting the *Kidney* longitudinally, shew themselves very readily. This part of the *Substance* is in colour reddish, and is about a third part of the depth of the *Kidney*.

Next within these appear a Number of small *Interior*. *Urinary Vessels*, which look like pale fleshy *Fibres*, which joining together make the *Caruncule Papillares*, which are only a *Bundle* or *Col-Papillæ*. lection of these little *Urinary Pipes*, and these a- Append. gain end in short *Tubulous Bodies*, or larger *Pipes*, Tab. xxxi. answering to the Number of the *Papillæ*, which Fig. 2. are usually twelve, and are call'd *Fistule Membranaceæ*, being only *Productions* of the *Membranous Cell*, call'd the *Pelvis*, which is a *Cavity Sinus* or in the *Concave* part of the *Kidney*, possess'd by *Pelvis*. a *Dilatation* of the *Ureter*.

The *Ureters* are long round *Membranaceous Ureters*. *Pipes*, protended from the *Kidnies* to the *Bladder*, Tab. II. for the *Conveyance* of the *Urine*. Fig. I.

They run with an *Inflexion* somewhat resembling the Letter *S*, and are obliquely inserted *Their* into the *Bladder* near the *Neck*, after having *Course* run some space betwixt the *Membranes*. *and In-*sertion.

They are ordinarily about the bigness of a *Duck's Quill*, though in *Calculous Cases* they are *Their* sometimes distended to a much greater size. *Magni-*tude.

They

Blood-
Vessels

They receive *Arteries* from, and return *Veins* to the Trunks of the *Aorta* and *Cava*, and *Nerves* from the *Intercostals*, and from the *Medulla Lumbaris*, by means of which they are rendered extremely sensible, and though distensible, as we have said, to a vast degree, yet not without excessive Pain.

Emul-
gents.

Tab. II.
Fig. I. h.

Their Di-
stribution
in the
Kidnies.

The *Kidnies* have *Arteries* and *Veins*, which are call'd by one common Name *Emulgents*, and are usually but one of a sort to each *Kidney*, though they have been observ'd sometimes to vary in their Number. The *Emulgent Arteries* spring from the *Aorta* by a single Root, but usually, at the entrance into the *Kidnies*, divide themselves into two Branches, and those again into divers others, the several Ramifications of which are distributed into all the *Glands*, which make the Cortical part of the *Kidnies* and which in young *Children*, and some *Brutes*, especially in *Hogs*, are congregated into Bunches like distinct *Lobes*, as those in the *Lungs* are, which inequality is visible in the Surface, but disappears by Age and Time, which level and render them smooth in *Men*.

Secretion
of Urine.

From the Blood convey'd by these *Arteries*, the *Urine* is separated by the *Glands* into the *Ducts*, or *Papillæ*; and *Fistulæ Membranaceæ* before mentioned, and thence through the *Pelvis* and *Ureters* into the *Bladder*. After the *Secretion* of *Urine*, the Blood is return'd by the *Emulgent Veins* to the *Cava*.

Adipose
Artery
and Vein.

Besides these Blood-Vessels, there is a peculiar Artery and Vein, which serve the Exterior Membrane of the *Kidnies*, and are by a distinct Name call'd the *Adipose Artery* and *Vein*.

Nerves.

The *Nerves* of the *Kidnies* come from the *Plexus* of each side, call'd the *Plexus Renalis*, which is form'd out of the Branches of the *Intercostal*, and *Medulla Spinalis*. The Twigs of which

which twine pretty thick about the *Emulgents*, especially the *Artery*.

There are *Lymphaticks* belonging to the *Kid-Lymphaticks* *nies*, which in *Brutes* are observ'd to exonerate themselves into *Pecquet's Receptacle*; but Human Subjects are examin'd too long after Death, for them to appear so plain; yet if you blow into the *Arteries*, *Veins*, or *Ureter*, the rest being tyed, you'll see the *Lymphæducts* distended.

Between the Trunks of the *Aorta* and *Cava*, *Glandulæ Renales*, and the *Kidnies* a little above the *Emulgents*, are situated two *Glands* of an irregular uncertain Figure, call'd *Glandulæ Renales*, *Capsule Atrabilarie*, *Renes Succenturiati*, which in a *Fœtus* almost equal the *Kidnies* themselves in Magnitude, but gradually shrink, till in Adult Persons they come to be very inconsiderable. They have their Blood-Vessels sometimes from the neighbouring Trunks, *Vessels* and sometimes from the *Emulgents* and *Nerves* from the *Plexus Renalis*. They have a Cavity which is usually fill'd with a blackish Liquor, but no proper Excretory Duct having been yet discover'd, we remain in the dark as to the use of these *Glands*.

C H A P. XVIII.

Of the URINARY BLADDER and URETHRA.

THE URINARY BLADDER, the Receptacle *Vide* of Urine, is situated in the *Pelvis* of the *Tab. II.* *Abdomen* in Men, immediately upon the *Intestini* *Fig. 1. r.* *num Rectum*; in Women, upon the *Vagina Uteri*, which lies betwixt them. Its Figure in *Quadrupeds* resembles a Pear with the Basis upwards, but in Human Bodies the lower part is almost upon the level with the upper; and its Orifice or Neck, lies side-ways, while the *Fundus*, or *Fundus*, Bottom, (as it is called) which in a Human *or broad* *Bladder part.*

Bladder is very broad, rests upon the *Rectum*, or *Vagina Uteri*.

Mem-
branes or
Coats.

It consists of three Membranes, the outward of which, or common Membrane, is derived from the *Peritoneum*: The middle one, which is call'd the *Musculous Coat*, is composed of fleshy Fibres running longitudinally, which are intersected by others, irregularly disposed a-cross them: The third is said to be Nervous, and has a great Number of Glands under it, which separate a Mucous Matter to defend it from the Acrimony of the *Urine*, which otherwise might offend it, being extremely sensible.

Tab. III.
h.

It is capable of being extended to a great degree, and consequently the External Dimensions of it are liable to great Alterations.

Connexi-
on.

It is ty'd to the *Peritoneum* and Navel by the *Urachus*, which, after Birth, serves only as a Ligament. The Neck of it in Men adheres firmly to the *Rectum*, and in Women to the *Vagina Uteri*, and before to the *Ossa Pubis*, by means of the *Peritoneum*.

Perfora-
tions for the
Ureters.

It is pierced by the Ureters, two or three Inches above the Neck, which, as we have already observed, are very obliquely inserted to hinder the return of the *Urine*.

Sphincter.

At the Exit of the Bladder, to prevent the perpetual dripping of *Urine*, is plac'd a Muscle consisting of circular Fibres, which is call'd the *Sphincter Vesicae*. This Muscle keeps the Bladder constantly shut, and is only open'd when, by the Contraction of the Abdominal Muscles, the Bladder is compress'd, and the *Urine* forc'd out.

Urethra.

Adjoining to the Neck of the Bladder is the *Urethra*, which is the Excretory Pipe or Tube, for the *Urine* to pass through; which is much shorter in Women than in Men, and much wider, and capable of greater Distention, as the Operation of extracting Stones by dilatation proves.

The

Ch. XIX. *Of the Genital Parts of Men.* 115

The Bladder and *Urethra* have Veins and Arteries from the *Epigastricks* and *Iliacks*, and in Women from the *Spermaticks* likewise, and Nerves from two *Plexus* in the *Pelvis* of the *Abdomen*, form'd out of Branches of the *Par Vagum*, and the Nerves of the *Os Sacrum* united. Nerves.

There are three pretty notable Glands discover'd not long since by Mr. Cowper, whose Excretory Ducts terminate in the *Urethra*, and which are situate not far behind its Membrane. But these relating, in their Use, rather to the Parts of Generation than to the Urinary, they shall be describ'd with the *Penis*.

C H A P. XIX.

Of the Parts of Generation proper to Men.

Under this Head of the GENITAL Parts of Vide Ap. Tab. xxxii & xxxiii.
Men, are included, as Principal of this Chapter, *The SPERMATICK Vessels, The TESTICLES, The PARASTATÆ, The VASA DEFERENTIA, The VESICULÆ SEMINALES, The PROSTATES, and The SCROTUM.*

THE SPERMATICK *Vessels*, otherwise call'd Vasa Præparantia.
VASA PRÆPARANTIA, are two Arteries and two Veins, though in these Vessels Nature does not always observe the same Rule, varying often their Number, Origination; and Insertion; but most commonly they hold that Number.

The *Spermatick Arteries* ordinarily arise from the fore-part of the Trunk of the *Aorta*, about two Inches below the Emulgents. Spermatick Arteries.

The Structure of these Arteries is very singular: For, contrary to the Course of all other Arteries, which are largest at their Exit from the Trunk whence they part, and grow gradually

App.
Tab.
xxxii.
Fig. 1.

* Phil.
Trans.
N^o. 280.
P. 1180.

Their
Course.

Ib. N.
And
Division.
Ib. O.

less in their Course, these are less in their Origin from the *Aorta*, than in their Progress towards the *Testes*. By this Stricture at their Orifice the Blood receives a Check at its first going off from these Parts, whereby its *Impetus* and Velocity are abated. The same End is answer'd by a different Mechanism in *Quadrupeds*, whose Spermatick Arteries are curl'd and contorted in their Passage like a Screw. For which different Methods of doing the same thing, * Mr. Cowper gives a Reason, which seems to me beyond Exception just; (*viz.*) " That if the Human Spermatick Arteries " were contorted, as in *Quadrupeds*, the Aper- " tures in the *Abdominal* Muscles of Men must " be much larger than now they are, and would " frequently let the Intestines descend into the " *Scrotum*; an Accident, which, however, often " happens. To such Ruptures (as they are cal- " led) *Quadrupeds* are not so liable, though the " Passages for the Spermatick Vessels be much " wider in them than in Men; because the Po- " sition of the Trunks of their Bodies being " *horizontal*, their Intestines cannot press on the " Processes of the *Peritonæum*, as in Men whose " Posture is erect.

These Arteries, immediately after their meet- ing with the Spermatick Veins, enter together with them, the inner *Lamella* of the *Peritonæum*, which affords them a Coat, wrapp'd up in which they run along the *Psoæ* Muscles, till they reach the *Processus* of the *Peritonæum*, bestowing some Branches in their Passage upon the *Peritonæum*. Here insinuating themselves into the Duplication of the *Processus*, and being streightly cloath'd with it, they pass the *Foramina* of the oblique and transverse Muscles of the *Abdomen*, and at about three or four Fingers breadth from the *Testicles*, are divided into two unequal Branches, the bigger of which goes to the *Testicle* it self, where,

where, after having enter'd the Substance of it, it is split into an abundance of Ramifications, disposed like the Tendrils of Vines which are dispersed all through it. The lesser descends to ^{lb. P.} the *Paraſtata* or *Epididymis*, and there is distributed, as the other is, in the *Testicle*.

The *Proceſſus* of the *Peritoneum* embraces these Vessels very closely, and, together with them, exactly fills up the Perforations of the Muscles, and so prevents the falling through of the Intestines; to which the erect Posture might render them obnoxious if they were wider, as in Dogs, and some other Animals they are, whose *Horizontal* Posture does not expose them to that danger.

The *Spermatick* Veins take the same Course <sup>*Sperma-*
tick Veins,</sup> with the Arteries, but a little above the *Testicles* they split into several Branches which unite again several times, forming thereby that sort of *Plexus* call'd *Corpus Varicosum Pampiniforme*, or *Pyramidale*. <sup>*Corpus*
Varico-
sum Pam-
pini-forme</sup> The Blood return'd by these Veins is deliver'd on the right side to the *Cava*, a little above the *Exit* of the Artery from the *Aorta*, and on the left side into the *Emulgent* Vein, to avoid crossing the great Artery; in its Passage over which, the Blood might be stopp'd by the pulsation of the subjacent Artery, or perhaps the Vein it self be broken. In these Veins are divers *Valves*, as well in the Parts nearer to the <sup>*Valves*
lb.</sup> *Testicle*, as at their *Exit* into the *Cava*, and left <sup>*lb.*
dddd.</sup> *Emulgent*.

Along with these Vessels, on each side, go ^{*Nerves.*} two Branches of *Nerves*, one from the *Plexus* of the *Pelvis*, form'd out of the Branches of the *Intercostals*; the other from the second Pair of the *Vertebrae* of the *Loins*, which latter however is very often not found.

The *Testicles* are soft white Bodies, usually in ^{*Testicles.*} Number two, though some have naturally had

Their Sub-
stance.

three, and others but one; *their Figure is oval, and their size about the bigness of a small Pullet's, or large Pidgeon's Egg.* They have been thought to have been of a Glandulous Substance, and according to the present prevailing Notion of the Structure of Glands, they may be allow'd to be so still, notwithstanding the Discovery of that inquisitive *Anatomist Dr. De Graaf*, who finds them to be nothing but a Convolution of Vessels of divers kinds, whereof the principal are the Blood-Vessels before described, of which the Arteries bring the Blood from whence the Seed is to be separated, and the Veins return it after that Separation made. The rest of the *Testicle*, which is much the greater part, is made up of Seed-Vessels, which are indeed but one continued Series or Rope intricately convoluted, and wound up as it were into a Bottom, but adhering so laxly, that they are easily drawn out into length; and, in Rats, shaken from their close Contexture, by first separating the *Tunica Albuginea*, and putting the *Testicle* into Water, and then agitating it lightly, these *Seminal Tubuli* will be very manifestly disjoin'd.

How unravell'd in
Rats.
App.Tab.
xxxiii.
Fig. 2.

No interspersed
Glands to be found.

Some have fancy'd Glands to be necessarily interspers'd for the Separation of the Seed: But no Man has been able yet to demonstrate them, nor does the Necessity appear, if we suppose, as at present many do, that all Glands are but a Convolution of the Sanguineous and Excretory Vessels, though in other Parts their Texture be not so loose, nor their Excretory *Tubules* so conspicuous.

The Epididymide.
Ib.
Fig. 1.

These *Seminal Tubuli*, or Vessels, terminate in the *PARASTATES* or *EPIDIDYMIÆ*, which are *tuberous varicose Bodies, lying upon, and adhering to, the upper Part of the TESTES*, of which they seem properly a part, tho' of a different Form and Consistence. For tho' the *Parastatæ* be only a various Convolution of the *Seminal Tubuli*, mix'd with

with the Blood-Vessels, as the *Testicles* themselves are, yet here those *Tubuli* being united into one, the various *Convolution*s of which, being more firmly bound together by a strong Membrane arising from the *Tunica Albuginea*, the Body of it feels more compact.

The *Testicles* and *Parastates* are said to be in-^{Proper} clos'd in three proper Membranes. It is pre-^{Cats.} tended the first is deriv'd from the *Cremaster* Muscle, which we take to be a needl^{sa.}ess Multipli-^{Musculo-}cation of Membranes; all Muscles, like this, ha-
ving their proper Membrane, which is all that is meant herein. This *Cremaster* Muscle presenting it self, must be removed before the proper Membrane of this part can be seen: It springs fleshy from the Spine of the *Os Ilium*, and in its descent expands it self on the Surface of the *Tunica Vaginalis*, to which it firmly adheres.

The *Tunica Elytroides*, or *Vaginalis*, is a Con-^{Vaginalis.}tinuation of the external *Lamina* of the *Peritoneum*, and is liable to be divided into several Membranes, which some Anatomists please themselves with. It incloses the whole *Testicle*. The third Coat is the *Albuginea*, so call'd from ^{Albugi-}its colour, which is white. It is a strong thick ^{nea.}Membrane, very smooth on the outward Surface; the inward, which adheres to the Substance of the *Testicle*, is rough and uneven. Into the upper part of this Membrane are inserted the Blood-Vessels, Nerves, and Lymphatics, which send from thence divers Branches into the Substance of the *Testicle*.

The LYMPHATICKS, which do not appear ^{The Lym-}in the common Dissections, shew themselves pret-^{ph.educt.}ty plentifully upon this Membrane, if a Ligation be laid upon the *Corpus Varicosum*, of a Dog, or any other live Subject. They go to the common *Receptacle* of Chyle.

- The Scrotum.* The common *Capsula*, or Membrane, where-
in the *Testicles* are contained, is the **SCROTUM**.
- Membranes.* This consists of two Membranes, the Exterior
being only a Production of the *Cuticula* or *Cutis*,
which is here somewhat thinner than in other
Parts, without any Fat under it. The inner
- Dartos.* Membrane, which is call'd *Dartos*, is only an
Expansion of the *Panniculus Carnosus*, which,
together with the *Cutis*, is drawn into the Fi-
gure of a Purse externally. This Purse is, as it
were, divided by a Line which runs longitudi-
nally, and parts it into the right and left side,
and is call'd the *Suture*; answering to this, in-
wardly, is a Membrane which divides the Cavi-
ty just in the same manner, being only a Produ-
ction of the *Dartos*, as the *Mediastinum* is of the
Pleura. It is like that divisible into *Lamellæ*,
and the *Testicles* are on each side loosely con-
nected to it, by means of their outward proper
Tunic. It serves to sustain the *Testes*, and to de-
fend them from Collision against each other, to
prevent their falling down too low, in which it
is auxiliary to the *Cremasters*, and to promote
the Corrugation of the *Scrotum*.
- The Vas Deferens.* From each *Testicle* proceeds a round hollow
Body, resembling somewhat, in external appear-
ance, a large Nerve, which is call'd **VAS DEFE-
RENS** or **EJACULANS**. It arises from the Ex-
tremity of the *Epididymis*, and is nothing else
but a Production of the Seminal *Tubulus* or Chan-
nel, which is continued from thence to the *Ve-
sicule Seminales*. It is about the bigness of a
small Goose-Quill, and ascending along with the
Vasa Preparantia, it makes several Serpentine or
Worm-like Turnings and Windings, before it
leaves the Body of the *Testicle*, where it compo-
ses that Body call'd the *Epididymis*, and thence
enters the *Abdomen*, with the afore-mention'd
Vessels, through the Perforations of the Trans-
verse
- The Sep-
tum of the
Scrotum.*
- The Vas
Deferens.
App.
Tab.
xxxii.
Fig. 1.
L L L K.*
- The Epi-
didymis.*

verse and Oblique Muscles. Having enter'd the *Abdomen*, it is reflected towards the back of the Bladder, and crossing the *Ureter*, grows larger, as it approaches the *Vesiculæ Seminales*; and then again contracting it self just at the *Vesiculæ Seminales*, the two *Deferents* come together, and seem to pass between them into the *Prostates*, and thro' them into the *Urethra*, without communicating, till then, either with one another, or with the *Vesiculæ Seminales*, or *Prostates*.

It has been a Controversy among the Anato-^{Contro-}mists, whether the *Vasa Deferentia* had any ^{very con-}Communication with the *Vesiculæ Seminales*, or ^{cerning}did deposite into them the Seed which they con-^{the Con-}vey'd from the *Testicles*. Dr. *Wharton*, *Swam-*^{the Seed}*merdam*, *Van Horn*, and of late Dr. *Garth*, in ^{into the}his *Lectures* at the College of Physicians, have ^{Vesiculæ}maintain'd the negative, as others have done the ^{Seminales}affirmative, whose Reasons for their Opinions we shall take notice of by and by.

The VESICULÆ SEMINALES are two mem-^{Vesiculæ}branous Bladders, situate between the *Vesica Uri-*^{Seminales}*naria* about the Neck, and the *Intestinum Rec-*^{App.}*tum*. They are ordinarily three or four Fingers ^{Tab.}breadth long, and one broad, and about the third ^{xxxiii.}part of an Inch thick, though their Dimensions ^{Fig. 1, 2.}vary very much in the same Subject, according as they are full or empty.

They consist of divers membranous Cells, which ^{Cellulæ}are plainly to be seen in a *Vesicula Seminalis*, ^{Vesicula-}blown up and dry'd, and afterwards cut. These ^{rum Se-}Cells open one into another, as appears by the ^{minarium}ready Communication of the *Flatus*. They are not all of a size, but some are greater, some less, and all are form'd out of the same fibrous Membrane; through the Contraction of which, by the Influx of the Animal Spirits in *Coitu*, some will have the Emission to be occasion'd; though I cannot think the Fibres sufficient for that Purpose.

These

Convolut-
ions of
the Vesi-
culæ Se-
minales.

These *Vesiculæ* appear externally, variously and unequally contorted and convoluted, resembling the irregular Figure of the Intestines of a small Bird, cover'd with a thin Membrane, upon which creep many Branches of Arteries, Veins, Nerves and Lymphaticks.

No Com-
munica-
tion be-
tween the
Vesicles.

From each side they empty themselves, without communicating with each other, into a small Duct, which, about a Finger's breadth below the Neck of the Bladder, is inserted separately into the hinder part of the *Urethra*.

Septum
feu Caput
Gallina-
ginis.
Tab. iii.

Between the Mouth of each of these Ducts is a small *Septum* plac'd, to hinder the Seed coming from one side from rushing upon, and so stopping the discharge of the other. This *Septum* is call'd *Caput Gallinaginis*, or *Galli Gallinacei*, and on each side of it, through the fore-mentioned Orifices, the Seed rushes into the *Urethra*.

Caruncu-
læ serving
as Valves
Tab. iv.

But lest the Seed should perpetually leak at each Orifice, a *Caruncle*, serving for a *Valve*, is plac'd, which hinders it from ouzing weakly out, but when it is emitted with Vigour, gives way, and, after the Force is over, recovers the Situation again.

The Pro-
states.

The *Prostates* form a *spongy glandulous Body*, somewhat flattish on its upper Surface, situate just below the Neck of the *Vesica*, about the bigness of a Walnut. Authors have ascrib'd to it a Substance of two kinds; one *Glandulous*, and the other *Spongy* or *Porous*, which latter seems in reality to be nothing else but a *Congeries* of very minute Vessels, and extremely small membranous Cells: In the middle of those run the Excretory Ducts of the *Vesiculæ*, passing quite through without any Communication. It has Excretory Ducts of its own, pretty numerous. *De Graaf* does not remember to have observ'd them fewer than ten in Men, and in Dogs he has seen

Tab. Ib.
& v.

Their nu-
merous
Excretory
Ducts.

near

near an hundred. Every one of these discharges it self into the *Urethra*, some above, some below the *Caput Gallinaceum*, but all more laterally than the Orifices of the *Vesiculæ Seminales*, having each of them its proper *Caruncle*. Out of these issues a sort of *Glutinous transparent Liquor*, which some would have to be a third sort of Seed, but in my Opinion serves only to lubricate the Passage of the *Urethra*, and thereby to prevent any Adhesion of the true Seed, which might hinder its being emitted with a sufficient *Impetus*. The *Prostates* are externally cover'd with a fibrous Membrane, somewhat like that of the *Vesiculæ*, and through it are dispers'd the same sort of Vessels, and from the same Parts, as Arteries and Veins from the *Hypogastricks* and *Meseraicks*, and Nerves from the *Plexus* of the *Pelvis*.

Those who with *De Graaf* (which is the *Vesiculæ* greatest part of Anatomists) hold that the *Vesiculæ Seminales* are Receptacles only of Seed, elaborated before in the *Testicles*, and convey'd thither by the *Vasa Deferentia*, are press'd by the Arguments of their Adversaries, who urge that the *Vasa Deferentia* are continu'd down to the *Urethra*, without imparting or receiving any thing by the way; and this they infer from the *Vasa Deferentia* being brought, as it were, below the *Vesiculæ Seminales*, and approaching them only at their Extremity, where whatever they contain should rather, as they think, go out than come in. But this is no conclusive Argument, unless they did prove by an absolute Mechanical Necessity, that no Fluid in an Human Body could enter and come out again at different times, and under a different Force or Pressure, by the same Orifice.

But, not to answer one Objection with another, which might easily be done, it is plain that

Their Liquor
is not
Seed.

the Receptacles
only of the
Seed.

Argument
to the contrary from
the Position of the
Orifices of
the Vasa
Deferentia inconclusive.

That Objection answered.

Communica-
tion
between
the Defer-
ents and
Vesiculæ
demon-
strated by
blowing
into the
Deferents.

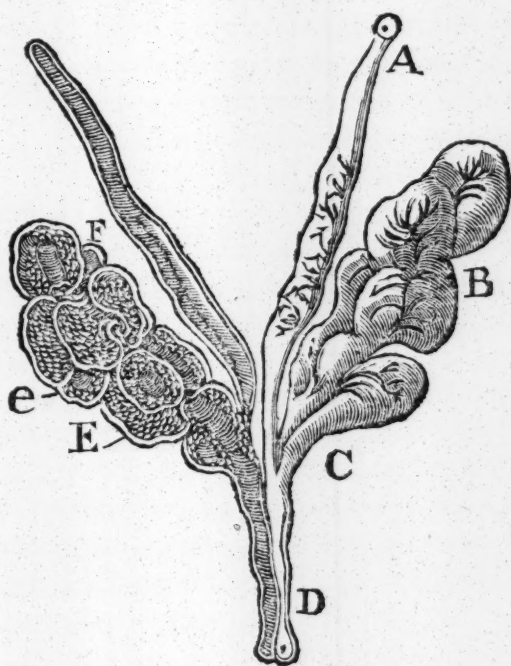
the *Vasa Deferentia*, and *Vesiculæ Seminales*, do communicate one with another, by the ease where- with the *Flatus* passes from the *Vas Deferens* to the *Vesiculæ* of the same side, and the Facility wherewith it is blown up, or Liquors are in- jected by a Syringe that way. This proves that there is a Communication in Fact, and it is not sufficient to ask, why Nature should choose to make this Seminal Liquor, as it were, turn back again, to ascend and fill the *Vesiculæ*, rather than to have inserted the *Vas Deferens* into the upper part of it, and so to have fill'd it the more ob- vious way. For tho' we should confess the rea- son of such a Procedure to be strange and incom- prehensible to us, yet that would not alter the Nature of the Fact. It should, indeed, caution us to be more modest in pronouncing concern- ing Particulars, whereof we were not sufficiently inform'd, and rather incline us ingenuously to confess our Ignorance, and to wait till time and farther Application, or the Industry of others, shall open to us the Mystery, than, when we can- not discover the real way by which Nature ope- rates, to fall to inventing first the End, and then the Means, which has been an old, but a very dis- ingenuous Method of Philosophizing in Physick.

Manner
of their
Communi-
cation.

But the Difficulty before us is neither so great, nor so puzzling, as to force Men into any such Shifts. For admit that the *Vasa Deferentia* be continued to the *Caruncles* in the *Urethra*, yet if the Neck of the *Vesiculæ Seminales* join them higher, and form together one *Tubulus*, or if it be but inserted into the *Deferens* with a patent Orifice, it is easy and natural to conceive, that the Seed, that is but gently protruded along the *Vas Deferens*, arriving at the *Caruncle*, should there be stopp'd, and the Protrusion still conti- nuing, should rather deflect laterally into the *Vesicula*, which is open, altho' that may be call'd,
in

in some measure, remounting, than force the Obstacle of the *Caruncle*, whose resistance is greater than that of the Weight of so much Seed as one of these *Deferents* will contain.

This is so far from being hard to be conceiv'd, *Illustrated* that it is the constant and regular Course of all *by the De-* Fluids in such Cases. For Example: Let us *scant of* suppose a *Tube*, form'd in the Figure of a Y, or, *Water in* which is all one, of the *Vesicula Seminalis* on *a forked* the Left side, here figur'd.



A, *The Left Vas Deferens.*
B, *The Left Vesicula Seminalis.*

C, *The Place of their Communication, at which the Seed is reflected into the Vesicle.*

D, *Their common Orifice*

clos'd by a Caruncle instead of a Valve.

F, *The Right Vas Deferens cut through, after having been inflated and dried*

Ee, *The Cells of the Vesicula Seminalis, as they appear in that State.*

If you pour Water into A, it will readily descend to D; but if at D there be a *Valve* placed, which

which neither the Weight of the Water, nor the force of its Direction, are able to overcome the Resistance of, then the Water will deflect at C, and rise up into B.

The Mechanism
simple, and
easy of
Concep-
tion.

This simple Piece of Mechanism is what so many ingenious Men have stumbled at, and thought themselves obliged to suppose several sorts of Seed to be form'd in these uncommunicating Parts: A trouble certainly they would not have put themselves to, if they had observ'd how easily the *Flatus* passes in a Body recently dead. But perhaps the ill Success of this Experiment, try'd upon a stale Body, when the Membranes were cold and stiff, and the Parts collaps'd and cohering, made these learned Persons maintain, that there was no communication.

Doctrine
of the se-
veral sorts
of Seed,
why taken
up of late.

We shall not spend any time in refuting that Doctrine of three sorts of Seed, because it was apparently taken up to avoid this Difficulty. The Seed of the *Testicles*, and *Vesiculæ Seminales*, appear manifestly the same, and nothing was wanting to make them be allowed so, but to prove the Communication. The *prostatic* Liquor is by most acknowledg'd not to be *true Seed*, no more than that which is emitted by Women: Nor is there any good Reason, why any Body should call it so, the Appearance being so very different, and another sufficient Use found.

Glands of
the Vesi-
culæ, se-
parate no
Seed.

The learned Dr. *Wharton's* ground, of imagining a peculiar sort of Seed to be separated in the *Vesiculæ*, (which was his Observation of a great many *Glandules* in them, which he suspected to be the Organs through which the Seed was separated,) would have been more material than the former, if those *Glands* which he mentions had been considerable for their Number or Magnitude. But they are so far from being sufficient for that Office, that they are not conspicuous, and by most other Anatomists have been unobserv'd.

unobserv'd. *De Graaf*, who sought for them, expressly denies their Existence. It seems therefore unreasonable to assign that Office to them, whilst their Existence is controverted.

However, it is not improbable that the *Vesiculae Seminales* may be furnish'd with Glands, as ^{Probable use of these} the *Vesicula Fellea*, and *Urinaria* are. But then we cannot assign them any other use than those Glands have in their respective Parts, that is, to afford a Mucous Lining, with this difference, that it is not to protect the Membrane from any Acrimony of the *Seed*, but to lubricate it, and facilitate the Expression of it, lest it should otherwise adhere to the inside of the Membrane, as all Viscous Fluids are apt to do to the sides of a dry Vessel.

C H A P. XX.

Of the Penis.

THE CUTICULA of the PENIS, differs not ^{The Cuticula.} from that of other Parts, unless on the *Glans*, where it is very delicate and thin, and appears to have a smooth Surface, not rough and squamous, as that of other Parts when view'd with magnifying Glasses.

The Skin it self is not so thick as 'tis generally found on other Parts. The doubling of it ^{The Cutis or Skin.} on the *Glans* makes the *Preputium*. Nature does ^{Tab. iv. A A.} not seem more wanton in any part of her Works ^{The Prepuce.} than in this, especially the *Prepuce*, for the Figure and Proportion of which I can scarce find ^{ib. a a.} any Standard. From hence, perhaps, arose the Necessity of *Circumcision*, so generally practis'd in all the Oriental Parts, as well as among the *Jews* to this Day. The first of which use it out of Cleanliness, and to prevent Diseases, which the

the Detention of the *Mucus* of the *Subpræputial Glans* might breed in those hot Countries. For even here I have seen some, who having large *Præpuces*, such as they call *Filberd Præpuces*, who have been frighted at the odd Appearance of that *Mucus* ouzing out, upon mere Plenitude, from between the *Præpuce* and *Glans*. Perhaps the great Law-giver of the *Jews* had a regard to this Convenience, in the first Institution of *Circumcision*: For we still meet with a great many Instances, where that Operation, or something like it, is necessary. It is tyed to the lower part of the *Glans*, by a Ligament call'd the *Frænum*. In this also Nature varies; for 'tis often so short, that, unless it be divided, it will not admit of perfect *Erections*.

The Liga-
ment of
the Penis.
The Fræ-
num.
Tab.vii.a.

Glans
under the
Præpuce.
Tab. iii.
a b
Use of the
Liquor
they sepa-
rate.

Causes of
the Con-
traction of
the Præ-
puce.

Ligamen-
tum Sus-
pensori-
um Penis.
Tab. II.
Fig. I. y.

At the Connexion of the other part of the internal Skin of the *Præputium*, are divers oval and roundish little *Glandules* placed irregularly, and that not only in the Neck, or joining of the *Glans* to the *Corpora Cavernosa*, but on the *Glans* it self. By these *Glandules* is separated that Liquor that renders the Agitation of the *Præputium* on the *Glans* easy; when this Liquor becomes rancid, as it does in old People, and in *Venereal* Contacts, it excoriates the *Glans* and *Præputium*, and very often exulcerates, and renders the *Præpuce* liable to contract, and obliges the Patient to have it divided. The Extremity of the *Præpuce* is apt to grow so streight in old Men, that they cannot bare the *Glans*, perhaps through the Defect of frequent *Erections*.

The other Ligament belonging to the *Penis* is call'd *Suspensorium*, from its Office, in holding up the *Penis* to the *Ossa Pubis*. It arises from the fore-parts of those Bones, and becoming thicker, divides for a Passage to the great Vein of the *Penis*, and is fasten'd to the upper parts of the *Corpora Cavernosa Penis*, on each side the great Vein of the *Penis*. The

The *Penis* is naturally destitute of *Fat*, and when it happens to have any (as there are Instances) it is a Disease, and incommodes it in the execution of its Office. In Children you will commonly find *Fat* on the *Penis*, but in grown Bodies 'tis seldom found, tho' the Membranes between the Skin and *Corpora Cavernosa* remain, and it's not improbable, that frequent Erections may prevent their Cells being charg'd with the Oil which composes the *Fat*, as appears by the Microscope. This want of *Fat* makes the Skin of this part very loose and distensible, and the Membranous Body between the Skin and *Corpora Cavernosa* divisible into several Coats, as appears when this part becomes affected in an *Anasarca*, in which the Membranes of this part, and the *Scrotum*, have been found thickned to more than three or four Inches. The external Teguments remov'd, the Body of the *Penis* offers it self; First,

The two *Corpora Cavernosa*, and the *Corpus Cavernosum Urethrae*, and their Vessels, frame the Body of the *Penis*. The two Cavernous Bodies, by some call'd *Corpora Nervosa*, *Spongiosa*, &c. have two distinct beginnings from the lower sides of the *Offa Pubis*, where they are smallest, which soon growing large and thick, join to each other, where they meet with the Cavernous Body of the *Urethra*, for which they leave an Interstice, or Channel, in their lower side, wherein is receiv'd the Cavernous Substance of the *Urethra*. The superior Surface of those Cavernous Bodies have a small Interstice, or Channel, also near the *Pubes*, in which the *Vena Penis* is lodg'd: Both these join by the Intervention only of a *Septum*. This, towards the Back or upper part of the *Penis*, is very thick and strong, and seems to be compos'd of the two outward thick Membranes, or Cases of the *Corpora Cavernosa* join'd to each other;

No Fat on
the Penis:

Corpora Cavernosa Penis.
Tab. iii.
P, P, A, D.

Their Septum.
Tab. iv.
Fig. ii.
A A.

other: The other Extremities of the two *Corpora Cavernosa* are capp'd with the *Glans*.

The Cor-
pus Ca-
verno-
sum
Urethrae.
Tab. iv.
Fig. i.
L, M, N,
O, Q.

The third Cavernous Body of this part is call'd *Corpus Cavernosum Urethrae*, because the *Urethra*, or Passage of Urine in the *Penis*, is inclos'd with it. Its External Figure differs very much from that of the two *Corpora Cavernosa*; for whereas they are lessen'd at their two Extremities, this is there largest, and lessen'd in its middle. Its upper part, that is placed between the two beginnings of the *Corpora Cavernosa* before they unite, I call, after Mr. Cowper, its *Bulb*, from its Figure, which is large, thick, and round, not unlike a Clove of Garlike, or an Onion. Its external Membrane is here very thin, and it is divided according to its length, by a *Septum* that is thickest toward the *Urethra*, which is not encompass'd with this Cavernous Body, till it passes under the two *Corpora Cavernosa* at their meeting. This Bulbous Part of the *Corpus Cavernosum Urethrae* is plac'd in that part call'd *Perineum*, which is between the *Scrotum* and *Anus*, and is cut through to come at the *Urethra*, in the Operation of cutting for the Stone in the Bladder: It is cover'd with the *Musculus Accelerator Urinae*, of which elsewhere. The middle Part of this *Corpus Cavernosum Urethrae* is almost Cylindrical, but the Passage for the Urine is not thro' its Center, but inclines to its upper part next the Body of the *Penis*.

Bulbus.
Urethrae.
Tab. v.
Fig. i. I.

Septum
Bulbi.
Tab. vii.
Fig. iii.
a a.

Cut thro'
in cutting
for the
Stone.

The other Extremity of this *Corpus Cavernosum Urethrae* is again dilated, and makes that Body, call'd the *Glans*; its external Figure is well known; it receives the Extremities of the *Corpora Cavernosa Penis*, in a Cavity or Depressure of it. Its internal reticular Substance is closer than that of the *Penis*. The Symmetry of these Parts being known, we come next to treat of their Vessels and internal Structure. First of

The Glans.
Tab. iv.
Fig. i.
N, O, Q.

The *Arteries*, which arise sometimes from the internal *Iliac* Branches, but most commonly from the lower parts of the *Umbilical Arteries*; whence it is, perhaps, that this part is less than usual, by tying the Navel-string too close, not only by the Retraction of the *Urachus*, through its Continuity with the Bladder, and consequently the *Penis*; but the *Arteries* of the *Penis*, springing from the *Umbilical*, are liable to Coarctation, if they are over-extended, whereby the requisite Plenty of influent Blood is denied the *Penis*: Before these *Arteries* reach the *Penis*, they commonly send out two or three Branches on each side, the two inferior of which carry Blood to the *Musculi Directores Penis*. The two Superior convey Blood to the adjacent Parts, particularly to the *Musculi Levatores Ani*, between which, and the *Musculi Marsupiales Femorum*, these great Trunks pass; but marching over the Cavernous Bodies of the *Penis*, they are both subdivided into two large Branches, the two inferior of which ii pass to the Bulb of the Cavernous Body of the *Urethra*, but the two superior k k are both subdivided again; the external d d running on the superior Surface of the Cavernous Bodies of the *Penis*, the internal ll entering their *Capsule*, pass through the middle of each Cavernous Body DD, wherein they divide into innumerable Branches, from whose Capillary Extremities are continued so many Veins, in the Channels of which are divers Apertures into as many Cells D, that communicate with each other, that empty themselves into larger Venous Ducts C, running on the superior Surface of the *Penis*, some of which join with the Veins of the *Prepuce* d, others make one large Trunk, which is call'd *Vena Penis* M, marching on the *Dorsum Penis*, immediately under the Ligament, that ties the *Ossa Pubis* together internally; by which Ligament the Vein is

Arteries of the Penis.

Tab. vi.

Fig. i.

G, G.

Musculi

Directores

Penis.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

Ib.

compress'd in an Erection, as shall be shewn by and by; but this Vein proceeding farther on the *Prostata*, it is there divided, and enters the internal *Iliac* Veins on each side. The Veins, which arise in like manner from the *Corpus Cavernosum Urethrae*, pass from its Bulb through the *Musculi Acceleratores CC*, and are compress'd by those Muscles.

Tab. vii.

Fig. i.

Nerves.

Tab. vi.

Fig. i.

H, H.

The Nerves spring from a Trunk composed by the *Coalescence* of the third of the *Os Sacrum*, and a Branch remitted from the great Crural Nerve, which, after their Union, provide Nerves for the *Testes*, *Perineum*, and Muscles of this part; which ascending on the Cavernous Bodies of the *Penis*, expand themselves on its upper Surface *cc*, and are afterwards distributed to all the parts of the *Penis*.

Ib.

Lym-

phæducts

Ib. L L.

Tab. vii.

Fig. v.

Discharge

them-

selves into

the In-

guinal

Glands.

The Cause

of Buboes.

The *Lymphæducts* of the *Penis*, are very numerous on its Surface under the Skin, in that loose Membrane that is in the place of the *Membrana Adiposa*. If you blow into the *Veins* of a Dog's *Penis*, its *Lymphæducts* will be inflated after its *Cavernous Body* is extended: These, like the *Lymphæducts* of the lower parts, discharge their *Lympha* into the *Glandule Inguinales*: Hence, perhaps, the morbid Matter in *Claps* is transferr'd into these *Glands*, and causes those *Tumours*, call'd *Buboes*, from the *Glands* call'd *Bubones*. On this account the opening these *Tumours*, before the usual time for *Suppuration* in other *Tumours*, appears necessary, lest the peccant Matter be convey'd by the exporting *Lymphæducts* of those *Glands* into the Mass of Blood, of which we meet with too many Instances.

Exact Re-

semblance

of the

Structure

of the

Spleen.

The Internal Structure of the *CORPORA CAVERNOSA*, agrees exactly with that of the *Spleen*. The *Arteries* of the *Penis*, after they enter its *Corpora Cavernosa*, are distributed into its *Reticular Substance*, which are chiefly compos'd of *Membranous*

Membranous Filaments, deriv'd from the *Capsulæ* Filaments. Ib.
 or sides of the *Corpora Cavernosa*, or their *Septa*; Fig. iv.
 These *Filaments* are variously intertext with (as they pass from the sides of the *Corpora Cavernosa*,) and support the Ramifications of the Blood-Vessels and Nerves. These Veins of the *Corpora Cavernosa* do not pass from it, as they commonly The Substance of the Cavernous Bodies. do from other parts in particular Channels, but their sides are here punch'd with numerous holes, that open into this *Cavernulous Substance*, which have such Communications, as that if you blow into either beginning of the *Corpora Cavernosa*, they both are readily distended; but the *Corpus Cavernosum Urethrae* will not be affected, tho' the other two are distended with Wind, unless in some Subjects (which is very rare) in whom the Veins happen to let the Wind pass from the *Cavernous Bodies* of the *Penis*, to that of the *Urethra*. From this Structure of the *Penis*, we may be inform'd of the particular Use of its Parts.

This Structure shews that the *Penis* is strictly Office of the Penis, an Organ of Generation only, and that the conveyance of Urine was not consider'd by Nature in this Mechanism, that being as well answer'd in Birds, Women, and all Female Creatures another way. But an Incitement to the Propagation of their Species had perhaps been wanting, but for this Organ; tho' the way of Propagation in most kinds of Fishes seems to argue the contrary. But of that we shall have occasion to speak more at large hereafter. At present it may suffice, that without such an Instrument, the Seed of the most perfect Animals could not be convey'd to the place of Prolification: And that an Alternation, as occasion requires, of Erection and Flaccidity, was absolutely necessary, the first, to the Performance of its Office, the latter, for the Security of the Part: Since without an Erection it were impossible to emit, and lodge the Seed where

it ought to be; and with a constant one, almost as impossible to secure the Part from many of those Injuries to which it would be perpetually exposed; not to mention the loss of Intigation, which must be a necessary Consequence of constant Erection.

Penis,
how erect-
ted.

That the Blood is the Matter which distends the *Corpora Cavernosa Penis* in an Erection, is manifest from abundance of Experiments, tho' the most certain is that of firmly tying the *Penis* of any Animal, (as has been done frequently to a Dog,) in *Coitu*, in which nothing but Blood has been found that distended it. In the Bodies of Criminals, that hang long after Death, the *Penis* becomes erected, the Blood, in that Position, falling to the inferior Parts and stopping there. By blowing into the Blood-Vessels after Death, the *Penis* becomes erected.

The Blood
by what
means
detain'd.

This was first observ'd by the Accurate Mr. Cowper, upon viewing its Veins, after he had distended them with Wind, whence it was very plain, that the External Trunks pass'd some under its Skin only, and some over the *Ossa Pubis*, which for distinction, he call'd *Venæ Præputii*. Besides these, a vast number of Veins (on the *Dorsum Penis*) unite, and empty themselves into one Trunk call'd *Vena Penis*, which passes immediately under a Transverse Ligament of the *Ossa Pubis*, and is compress'd by the Approximation of the *Dorsum Penis*, to the Ligament of the *Pubis*. This Application of the *Dorsum Penis* is effected by its *Musculi Directores*, pulling down the *Crura* of the *Corpora Cavernosa Penis*, which are ty'd up at their Juncture in the Body of the *Penis*, to the *Ossa Pubis*, by the *Ligamentum Suspensorium* above-mentioned.

Corpus
Caverno-
sum Ure-
thrae, how
erected.

This cannot happen to the *Cavernous Body* of the *Urethra*, because there is no Bone, whose Position (in Human Bodies, and most *Quadrupeds*) can

can give rise to a *Ligament*, which can have that effect on its Veins. Wherefore the *Musculi Acceleratores*, embracing the Veins of the *Bulb*, do that Office, tho' not so effectually as in the *Penis* it self; whence it is that the *Glans* is not always perfectly distended with the *Penis*, and soonest becomes flaccid on an Erection.

The Blood, by these means, being hindered in its return, the *Corpora Cavernosa* must necessarily be distended, if we consider the Structure of them above-mentioned, with respect to the Veins. The Arteries, which before were flaccid, have now their Trunks also extended, and do more plentifully import Blood into the *Corpora Cavernosa*. But since it is absolutely necessary, some part of the detain'd Blood should be still passing off, lest it becomes Grumous and unfit for a Reflex, the *Venæ Præputii* communicate with those of the *Penis* it self, as before observed; whereby part of the Blood may be return'd from the *Penis* during its Erection, and give way to a fresh supply from the Arteries, and preserve the Circulation in it uninterrupted. By this we are taught how to relieve an obstinate *Priapism*, by opening the Vein of the *Penis*.

This admirable Contrivance, in disposing these *Exporting Sanguiferous Ducts*, so that some are compress'd, whilst others remain altogether free and open, is not only seen in the *Penis* of Men, and *Pudenda* of Women, but in those parts of all other Animals, that have fallen under our Examination; with some difference of Instruments only, in some particular Creatures; as Mr. Cowper has instanced in the Male *Opossum*, in the Philosophical Transactions, N^o. 290. P. 1584. This Retardation of the Refluent Blood, is chiefly continued by means of a Sphincter Muscle. In a Male *Porpeff*, long since dissected by Mr. Cowper, were found two Bones, with their

Blood
how its
Circulation
is continued in
Erection.

Analogous
Structure.

Opossum.

In the
Porpeff.

Ligaments.

In Dogs.

ments, framed on purpose for this end. In a Dog he some time since observed likewise, a *Digastrick Muscle*, whose middle Tendon pass'd transversely on the Veins of that Animal's *Penis*, which seem'd to be provided by Nature, that when in *Coitu*, tho' the Dog is turn'd off the Back of the Bitch, and his *Penis* drawn off from the *Ossa Pubis*, which, without that Transverse Muscle, would make way for the Blood to pass off, and let its *Bulb*, by which the Dog is ty'd to the Bitch, grow flaccid.

Muscles
of the
Penis.
Tab. vii.
Fig. i. CC.
Tab. v.
Fig. i. L.
Accelerator
Urinæ.

The Muscles of the *Penis* are two Pair, and one odd Muscle; the first, that offers it self in Dissection, is the **ACCELERATOR URINÆ**, which appears on dividing the Skin and Fat in the *Perinæum*. 'Tis often join'd with the *Sphincter Ani*. It arises *Tendinous*, but soon grows fleshy, from the upper and fore-part of the *Urethra*, as it passes under the *Os Pubis*; its fleshy part encompassing the *Bulb* of the *Corpus Cavernosum Urethræ*; Both sides of this Muscle meet in a middle Line, corresponding to the Seam in the Skin over it: It continues so united about two Inches in length, then detaches two Fleshy Elongations c c, which become thin Tendons, at their Terminations on the *Corpora Cavernosa Penis*. This is commonly made a Pair of Muscles, but in truth is but One Muscle. Its upper part, that covers the *Bulb*, when in Action, streightens the Veins that pass through it from the *Corpus Cavernosum Urethræ*, and hinders the Reflux of the Blood in an Erection of the *Penis*, and by the repeated Contractions of this upper part, drives the Blood in the *Bulb* towards the *Glans*: The two Elongations, that part on the *Urethra*, and ascend to their Terminations on the *Corpora Cavernosa Penis*, so compress its Channel, as to force out the contain'd Seed or Urine, from which latter Use it has its Name,

The

The *Erectores Penis*, so call'd from their use, spring Fleſhy each from the *Os Iſchium*, below the beginning of the *Cavernous Body* of the *Penis* on the ſame ſide, and after an oblique Progreſs, end partly Tendinous, and partly Fleſhy, in the beginning of that *Cavernous Body*. When theſe act, the *Penis* is drawn to the *Pubes*, and by means of the *Ligamentum Suſpenſorium Penis*, its great Vein is apply'd to the tranſverſe Ligament of the *Oſſa Pubis*, and the reſluent Blood hindred from paſſing that way, whereby its *Corpora Cavernoſa* become diſtended. The laſt Pair of Muſcles that belong to the *Penis*, are call'd from their Poſition,

Transverſales Penis. Theſe are often wanting, and frequently vary in different Subjects: Sometimes they are derived from the *Sphincter Ani*, and terminate in the *Bulb* of the *Cavernous Body* of the *Urethra*. At other times you'll meet with a Muſcle on one ſide only: But ordinarily they ariſe from the *Iſchium* near the former, and are inſerted on both ſides the *Corpus Cavernoſum Urethrae*, immediately below its *Bulb*. When they act, they dilate either the *Bulb*, or that part of the *Corpus Cavernoſum Urethrae*, to which they are faſten'd.

There remain yet to be accounted for Three GLANDS diſcover'd by * Mr. Cowper, and not yet taken notice of by any other Anatomift. They all empty themſelves into the *Urethra*, and are by Mr. Cowper, from the Tenacity of the Liquor which they ſeparate, call'd the MUCOUS GLANDS of the *Urethra*. The two firſt diſcover'd of theſe are about the bigneſs of a French Bean, of a depreſs'd Oval Figure, of a yellowiſh colour like the *Proſtates*, and lie on each ſide the *Bulb* of the *Cavernous Body* of the *Urethra*, a little above it GG. Their *Excretory Duets* ſpring from their Internal Surface A b, next the

Erectores
Penis.
Tab. ib.
Fig. ib.
F G.

Transver-
ſales
Penis.
Tab. v.
Fig. i.
K K.

Tab. vii.
Fig. i. EE.

Mr. Cow-
per's Muſ-
cous
Glands of
the Ure-
thra.
* Philoſ.
Tranſ.
Nº. 258,
November
1699.

Tab. v.
Fig. i.
Ib.

Fig. ii.
Ib.

the Inner Membrane of the *Urethra* C, whence descending about half an Inch, they begin to grow less, and piercing that Membrane obliquely, open into the *Urethra* at D, by two distinct Orifices just below its bending, under the *Ossa Pubis in Perinaeo*, where they discharge a *Transparent Viscous Liquor*.

Mr. Cow-
per's
Third
Mucous
Gland of
the Ure-
thra.

Besides this Pair, there is a third **MUCOUS GLAND**, discover'd likewise by the same Mr. Cowper, to whose happy Sagacity, Industry, and Communicative Temper, the Inquisitive into this part of Knowledge are infinitely indebted. This is describ'd by him in the *Appendix* to his *Ευχæρισία*, and is a small conglobate yellowish Gland like the former, but somewhat less. It is situate about the Angle of Flexure of the *Urethra*, under the *Ossa Pubis* in the *Perinaeum* near the *Anus* F, as it was drawn from a Preparation, which Mr. Cowper has still by him. To find this Gland, the *Corpus Cavernosum Urethrae* must be divided lengthways to the Inner Membrane of the *Urethra*, which must be cautiously freed from the Body; which done, the Gland will appear in the Place already mentioned. It has two *Excretory Ducts*, which enter the *Urethra* obliquely about a quarter of an Inch below the Orifices of the two former K, and discharge a Liquor like theirs both in Colour and Consistence.

Tab. iv.
Fig. ii.

Tab. ib.
Fig. i.

Where the
Excreto-
ry Duct
of the
Right side
only is ex-
press'd.

Mr. Cowper, who is always ingenious, and generally right in his Conjectures about Anatomical Matters, thinks there may be two Uses of this *Mucus*. The First, to hinder any Remains of *Urine* from mixing with the *Semen*, in the *Urethra tempore Coitus*, which I can find no reason to expect there at that time. Yet I must subscribe to his Opinion, that the main Design of Nature, in framing these Glands, seems to respect the Grand Work of Generation. For by their Situation, they must necessarily be compress'd upon
Erecti-

Erection, and consequently discharge their Contents before the *Testes* and *Vesiculæ Seminales*, which are not subject to so immediate a Force. I apprehend therefore, that their *Mucus* serves to lubricate the Pipe of the *Urethra*, and thereby to facilitate the Emission of the *Semen*, and render it more Vigorous and Projectile, than otherwise it could probably be, if so viscid a Liquor, as the *Semen*, were to pass through a Channel absolutely dry, to which it would be apt to adhere, and so its Projection be obstructed.

Much less can I think, that they were by Nature contriv'd to defend by the *Mucus*, which they afford, the *Urethra* from the Acrimony of the *Urinous* Salts. For to answer that end, the *Urethra* should be constantly lin'd with it, and the Discharge continual, as it is in a *Gleet*, when the *Caruncula*, which closes the *Excretory Duct* of any of these Glands, happens to be eroded, as we observ'd it once in a Servant of mine; of which Mr. *Cowper* has given us the History, and the Figure, in his Description of these Glands, publish'd before his *Ευχαρισία*, both which I have thought worth the transferring hither. But as these Glands do not emit their Liquor *in Statu Sano*, but upon Compression, which cannot happen but in Erection, and that a pretty stiff one too, by reason the Resistance of the Caruncle must be forc'd, it is not probable, that this Liquor should be always discharg'd previous to the Urine, which is as often made with a *Flaccid Penis* as otherwise. Nor indeed do I see any need to hunt for any other Use, than that which I have assign'd in the preceding Paragraph.

Mr. *Cowper* having, with his Description of the first discover'd Pair of the Glands, hinted his Suspicion, that an inveterate * GLEET might proceed from a Venereal Ulcer happening upon the *Ostium* of either of these, whence, if an ab-

Cause of
Invete-
rate
Gleets.
* Philof.
Trans.
Novem-
ber 1699.
solute

solute Erosion of the Caruncle ensued, an Incurable Gleet might follow; an opportunity presented it self to me, to examine into the certainty of that Opinion, in a Servant of mine who died of a *Peripneumony*, but had been some Years troubled with an obstinate Gleet. In this Subject we found that the Caruncle, which should have clos'd the *Duct* of the *Mucous Gland* on the Left side, had been eroded by an Ulcer, and the Orifice of that, and of the Left *Duct* of the single *Mucous Gland*, laid into one, as appears by Tab. IV. Fig. I. (*) drawn from it by Mr. Cowper. Hence proceeded an almost constant Dripping of a Diaphanous Viscid Ropy Liquor, such as these Glands furnish, which is what we call a Gleet, and must necessarily happen to all Persons under the like Circumstances.

What a
Clap is.

He that considers, that a Clap is nothing but an Ulcer rais'd in the *Urethra*, by the Insinuation of some *Virulent*, or to speak more properly, *Acrimonious* Purulent Matter into it, will not wonder, that it should often hang and fix its Seat at the *Ostiola* of these *Excretory Ducts*. But of these Matters I shall take another Occasion to speak more largely.

T A B. III.

THE Fore-parts of the Bladder of Urine, and *Corpora Cavernosa Penis*, &c. somewhat less than the Life.

A A, The whole *Corpora Cavernosa Penis*.

a a, Their Extremities which are capp'd with the *Corpus Cavernosum Glandis Penis*.

B, The Skin of the *Penis*, which makes the *Præputium*.

b, Its Duplicature or in-

ternal Surface, that is continu'd to the Glans.

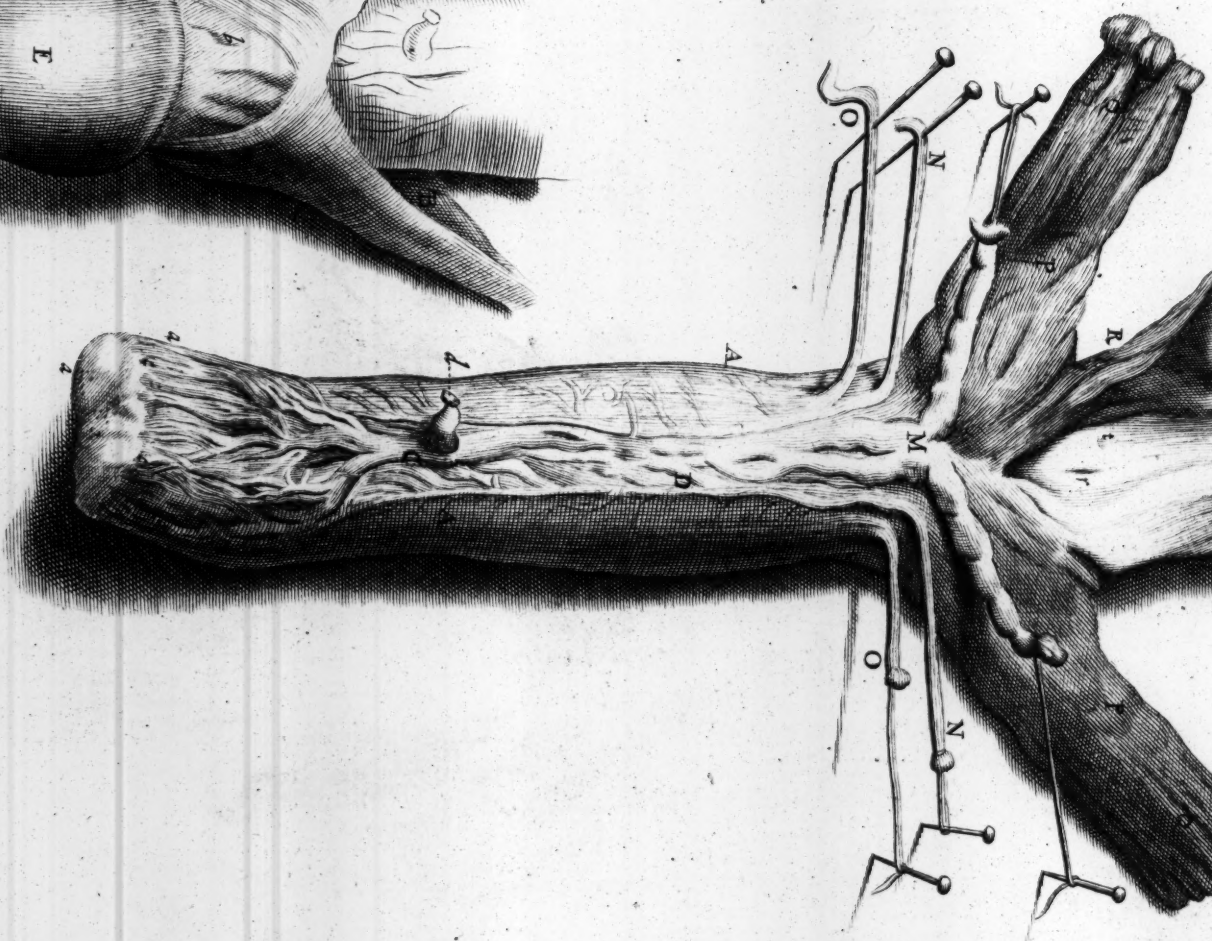
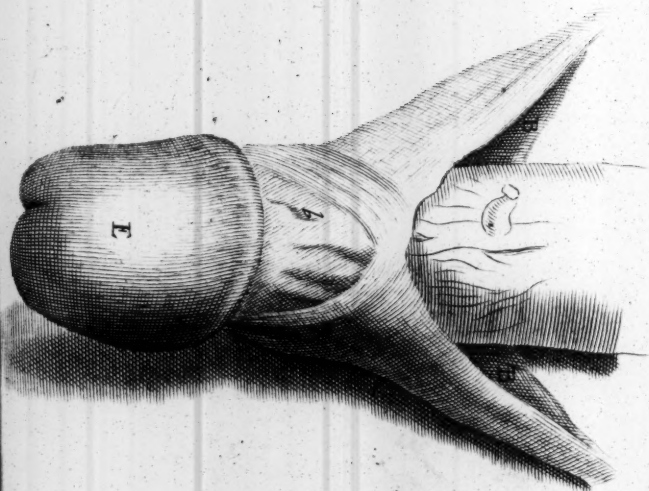
CD, The Blood-Vessels on the *Dorsum Penis*, fill'd with Wax.

cc, Their Trunks cut from the Glans.

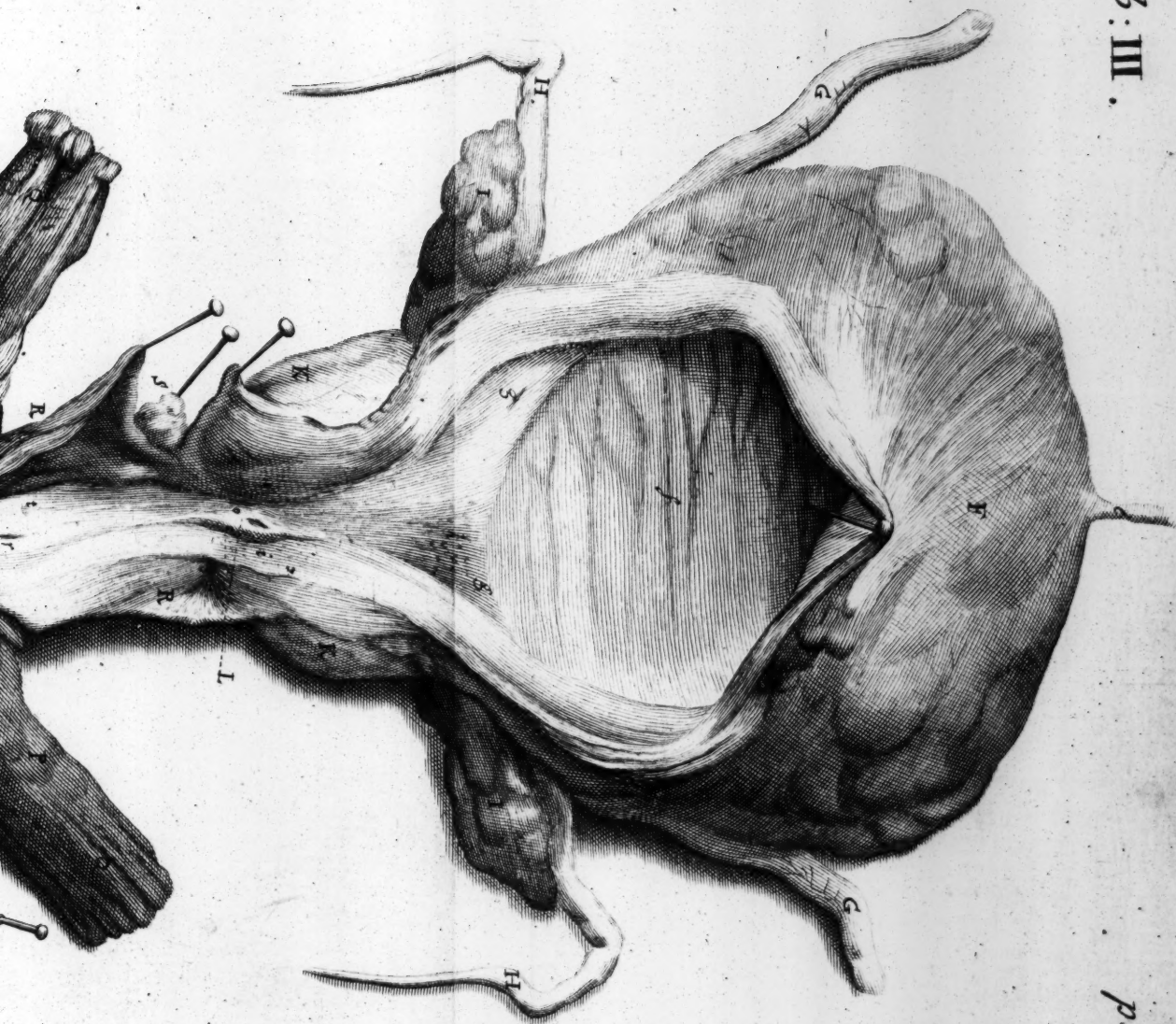
d, A Trunk of the Vein that receives Branches from the *Præpuce*, by which the Wax was injected, to fill the Veins at M D C.

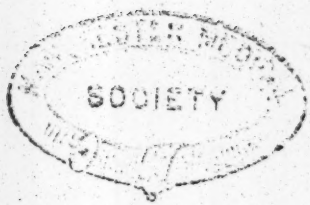
E, The *Glans Penis* fill'd with Wax, by the Vein.

e, A Pore



W. P. G. Smith Sculp.





e, A Portion of the *Urethra*.

F, The Fore-part of the Bladder of Urine.

f, Its inward *Nervous Membrane*, through which the order of *Muscular Fibres* may be seen.

g g, The two Orifices of the *Ureters*, as they open into the Bladder.

h, The small Glands, which may be seen by the naked Eye, between the two Orifices above mentioned, that separate the *Mucus*, which defends this Internal *Membrane* of the Bladder, from the Salts of the Urine.

G G, The *Ureters* cut off.

H H, Portions of the *Vasa Deferentia*.

I I. Parts of the *Vesiculae Seminales*.

KK, The Fore-part of the *Prostates*, which are here divided, together with the *Urethra*.

L, The *Caruncle*, or *Caput Gallinaginis*, which hinders the Seed from perpetually leaking at the two Orifices on each side of it here mark'd o o.

ii, The Mouths of the *Excretory Ducts* of the *Prostates*, on each side the *Caput Gallinaginis*.

M, That part of the Vein of the *Penis*, that is compress'd by the Ligament of the *Pubis*, in an *Erection*.

NN. The Arteries } on the *Dorsum Penis*.
OO. The Nerves }

PP, The beginnings of the *Corpora Cavernosa Penis*, cut from the *Ossa Pubis*.

QQ, The *Musculi Directores Penis*.

RR, The *Urethra* divided and expanded.

S, The *Mucous Gland* of the Right Side pinned out.

t, The Orifice of its *Excretory Duct*, as it appeared with its *Mucus* in it, ready to be discharged.

r, The Mouth of the *Excretory Duct* of the Left *Mucous Gland*, which was very open in this Subject, being in common with another *Mucous Gland* of the same side, express'd in the following Table, Fig. i. *. and Fig. ii. F.

T A B. IV.

F I G. I.

THE Fore-part of the *Urethra* open'd, to shew the Orifices of the *Excretory Ducts* of the *Mucous Glands*, somewhat less than the Life.

AAA, The inside of part of the Bladder of Urine.

B, A Probe in the Left *Ureter*, to shew its entrance into the Bladder of Urine.

C, The Right *Ureter*, whose lower part is slit open, to shew its Oblique Insertion between the *Membranes* of the Bladder, before
it

it opens into its Cavity.

D, The Miliary Glands of the Bladder.

E E, Parts of the *Vesiculæ Seminales*.

e, The Blood-Vessels, which are distributed on the *Vesiculæ Seminales*, and lower parts of the *Vasa Deferentia*.

F F, The *Prostates* divided and open'd.

fff, The sides of the *Urethra* divided and pinn'd out.

G, The *Caruncle* or *Caput Gallinaginis*, with the Mouths of the *Excretory Ducts* of the *Prostates* on each side, as in the preceding Table i. L.

H H, The two first and largest *Mucous Glands* pinn'd out.

II, Two Probes in their *Excretory Ducts*, of which, the Orifice of the Right side is in its Natural State.

(*) The other * was in-

larged in this Subject by an Ulcer.

K, A small Probe in the *Excretory Duct* of the lower and lesser *Mucous Gland*, vid. Fig. ii. F.

L, The *Bulb* of the *Cavernous Body* of the *Urethra* fill'd with Wax.

M M, The sides of that *Cavernous Body* fill'd with Wax, and divided according to its length, to shew its inside.

N, The *Glans Penis* fill'd with Wax, from the Vein mark'd d, in the preceding Figure.

O, The Cavity fram'd in the *Corpus Cavernosum Glans Penis*, in which the Extremities of the *Corpora Cavernosa Penis*, of the foregoing Figure mark'd a a, are receiv'd.

Q, The upper part of the *Glans* next the *Penis*.

P, Part of the *Membrana Carnosa Penis* pinn'd down.

F I G. II.

P Art of the Bladder of *Urine* and *Urethra* of a Boy inflated.

A, The lower and hinder part of the Bladder of *Urine*.

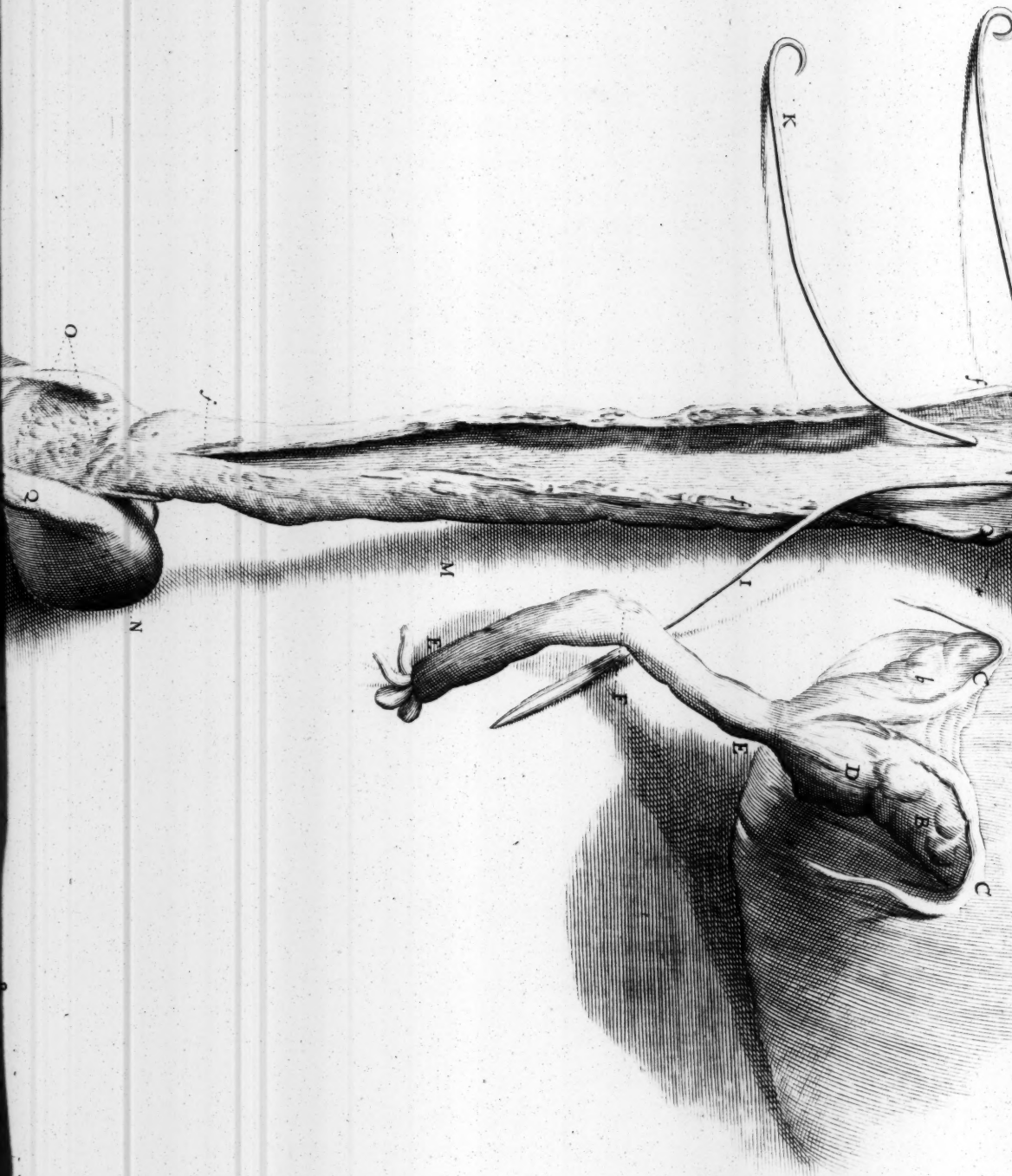
b B, The *Vesiculæ Seminales* blown up by

CC, The *Vasa Deferentia*.
D, The *Prostates*.

E E, The *Urethra* clear'd from its *Cavernous Body*.

F, The lesser *Mucous Glands* plac'd at the Angle, or turning of the *Urethra* under the *Ossa Pubis*.

T A B.



Tab: IV.

p. 142

Fig: 1.



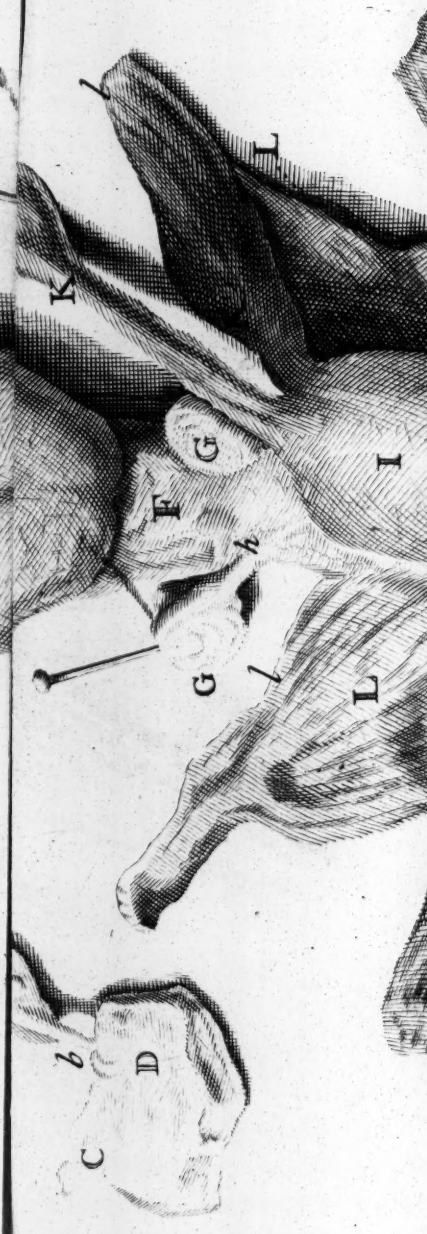
Fig: 2.

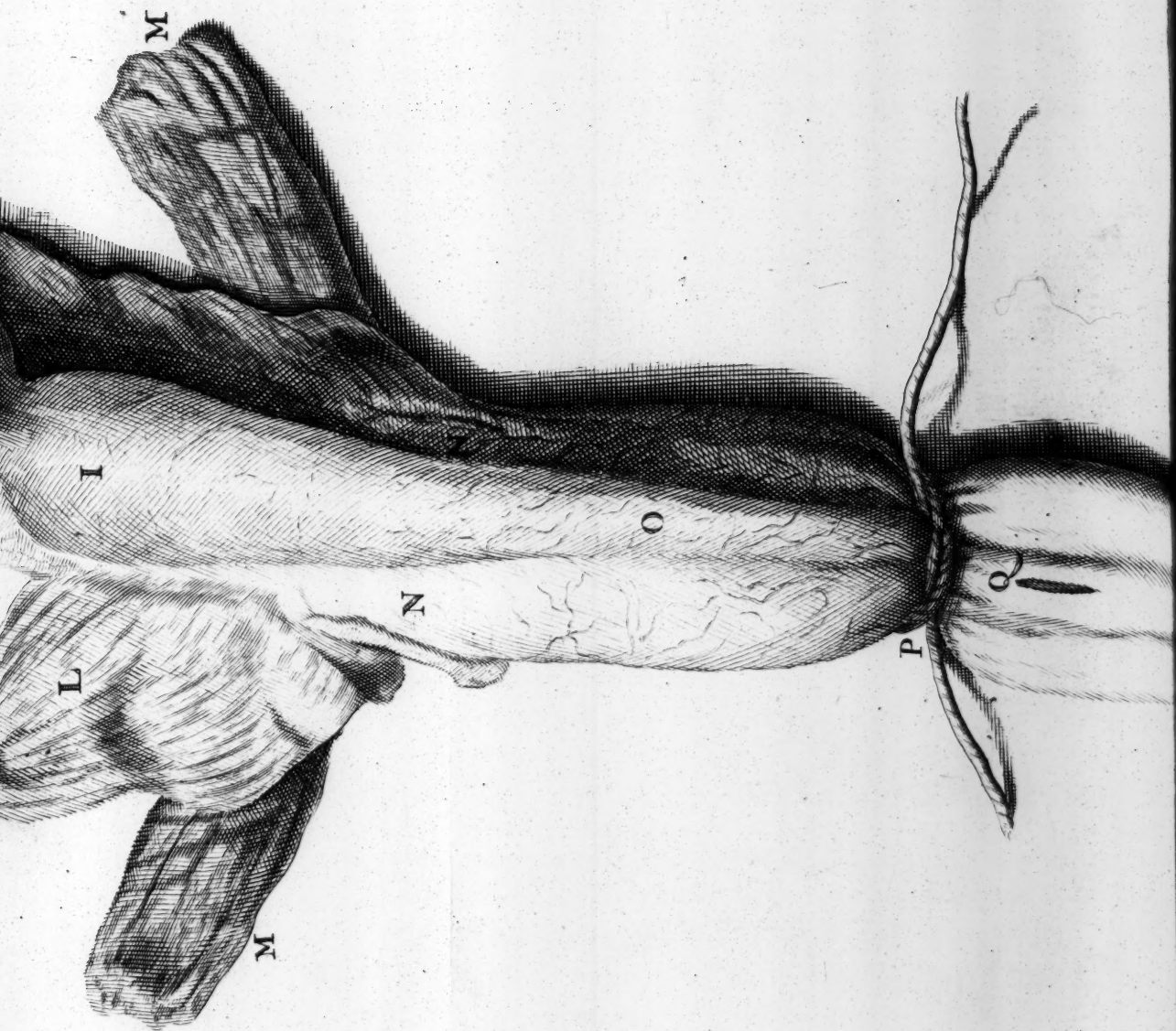




Fig. I.

Tab. V.





T A B. V.

F I G. I.

A, A Portion of the Bladder of Urine.

BB, Parts of the Ureters.

CC, Parts of the *Vasa Deferentia*.

DD, The *Vesicula Seminales* somewhat distended with Wind, by blowing into the *Vasa Deferentia*.

a a The Blood-Vessels of the *Vesicula Seminales*.

E, The *Glandula Prostate*.

F, The *Urethra* expanded after opening its superior and fore part to see the *Ostiola* of the *Excretory Ducts* of the following Glands.

G G, The two Glands above described, which from the Liquor they separate, (are call'd by Mr. Comper, who discover'd them) *Glandulae Mucose*.

h, The *Excretory Duct* of one of the last mention'd Glands, before it passes under the *Bulb* of the *Cavernous Body* of the *Urethra*.

I, The *Bulb* of the *Cavernous Body* of the *Urethra*, partly distended with Wind, and divested of the *Accelerator*

Muscle, to shew its *External Membrane*, which is very thin, whereby the last nam'd Muscle does more adequately compress the *Bulb*, and drive its contain'd Blood towards the Glands, when the *Penis* is erected.

K, The third Pair of Muscles of the *Penis*.

L L, The *Accelerator* Muscle divided in its middle Seam on the *Bulb*, and afterwards freed from it, and Expanded.

l l, The upper part of the Muscle, which passes immediately over the *Mucous Glands*.

MM, The *Musculi Directores Penis*.

NN, The *Cavernous Bodies* of the *Penis*.

O, The *Cavernous Body* of the *Urethra*.

P, The *Ligature* made to prevent the Wind from passing out of the *Cavernous Body* of the *Urethra*, and its *Bulb*.

Q, The *Aperture* by which the *Inflation* was made.

F I G. II.

ONE of the *Mucous Glands*, after being macerated in Water and its *Excretory Duct* fill'd with *Quicksilver*.

A, The *Mucous Gland* somewhat distended.

b, Its *Excretory Duct*.

C, A Portion of the *Internal Membrane* of the *Urethra* Expanded.

D, The *Ostiolum* of the last mentioned *Excretory Duct*.

T A B.

T A B. VI.

F I G. I.

THE Fore-part of the Human *Penis* prepar'd with Mercury.

A A, The Skin, together with the rest of the common Integuments of the *Penis*, freed from it.

a a, That part of them which compose the *Præputium*.

B, The beginnings of the *Corpora Cavernosa* separated from the *Ossa Pubis*.

bb, The Veins; cc, The Nerves; dd, The Arteries, as they appear on the back-part, or *Dorsum Penis*.

C, The *Glans* or *Balanus*.

DD, The *Musculi Erectores*.

E E, The *Transversales*.

F, Part of the *Sphincter Ani*.

f, A Blow-pipe in the *Urethra*.

GG, The Trunks of the two Arteries of the *Penis*, cut from the Internal Branches of the *Iliac Arteries*: g g, Their two Inferior Branches which run to the *Musculi Erectores*; hh, Their superior Branches which administer Blood to the adjacent Parts; ii, Those Arteries which pass to the *Bulb* of the Cavernous Body of the *Urethra*; kk Their large Trunks which are subdivided again; the External of which dd, pass on the superior Surface of the *Penis*; the Internal ll, enter the *Corpora Cavernosa*.

H H, The Nerves of the *Penis*.

I, The *Vena Penis*.

KK, *Vena Præputii* which inosculate with the former.

LL, The *Lymphaducts*.

F I G. II.

THE two *Corpora Cavernosa Penis*, and that of the *Urethra*, after a Transverse Section, when inflated and dry'd.

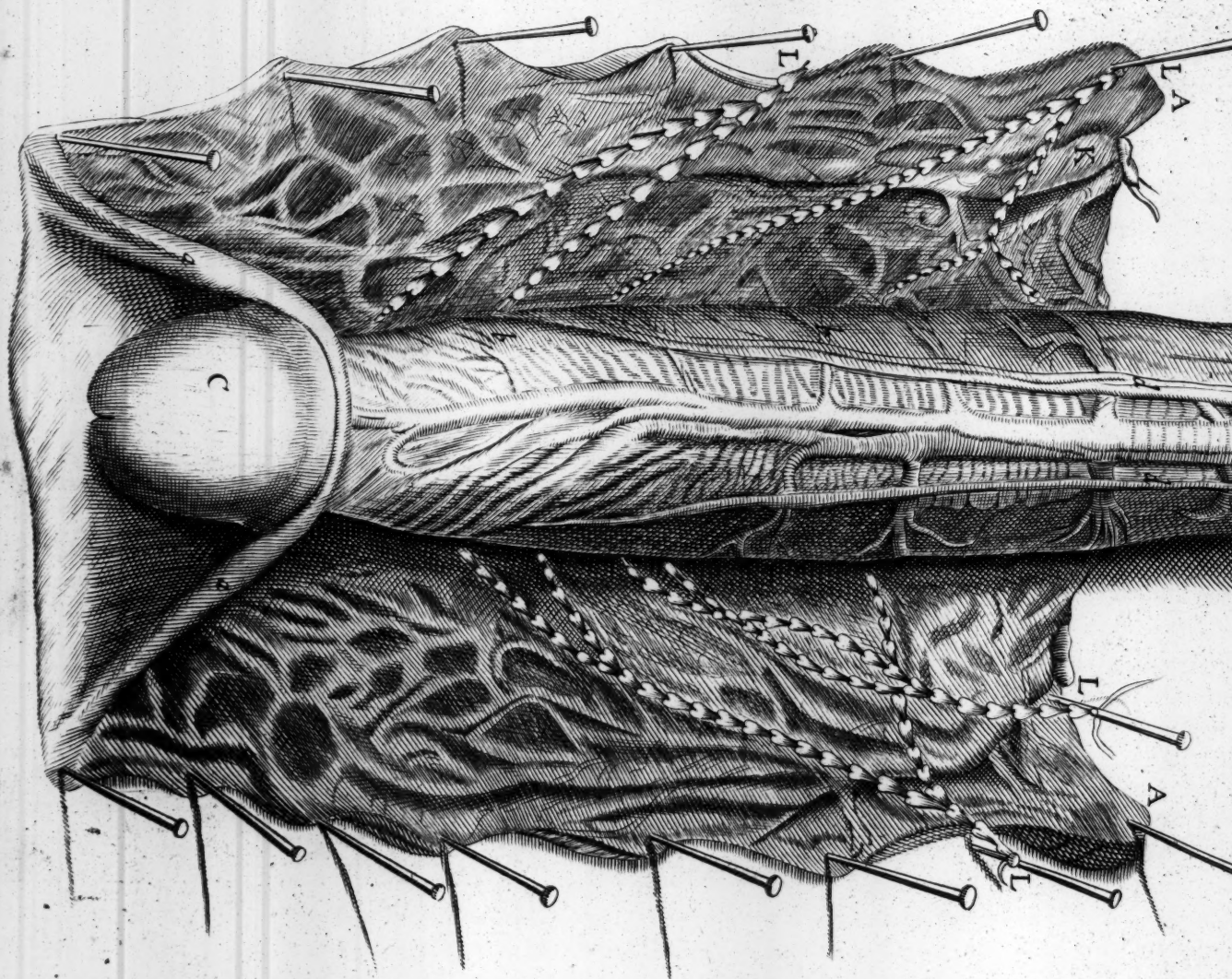
A A, The *Corpora Cavernosa Penis*.

B, The *Corpus Cavernosum*

Urethra.

C, The Trunk of the *Vena Penis*.

DD, The Trunks of the two Arteries passing through the *Corpora Cavernosa* of the *Penis*.



Tab: VI.

Fig. I.

p. 144

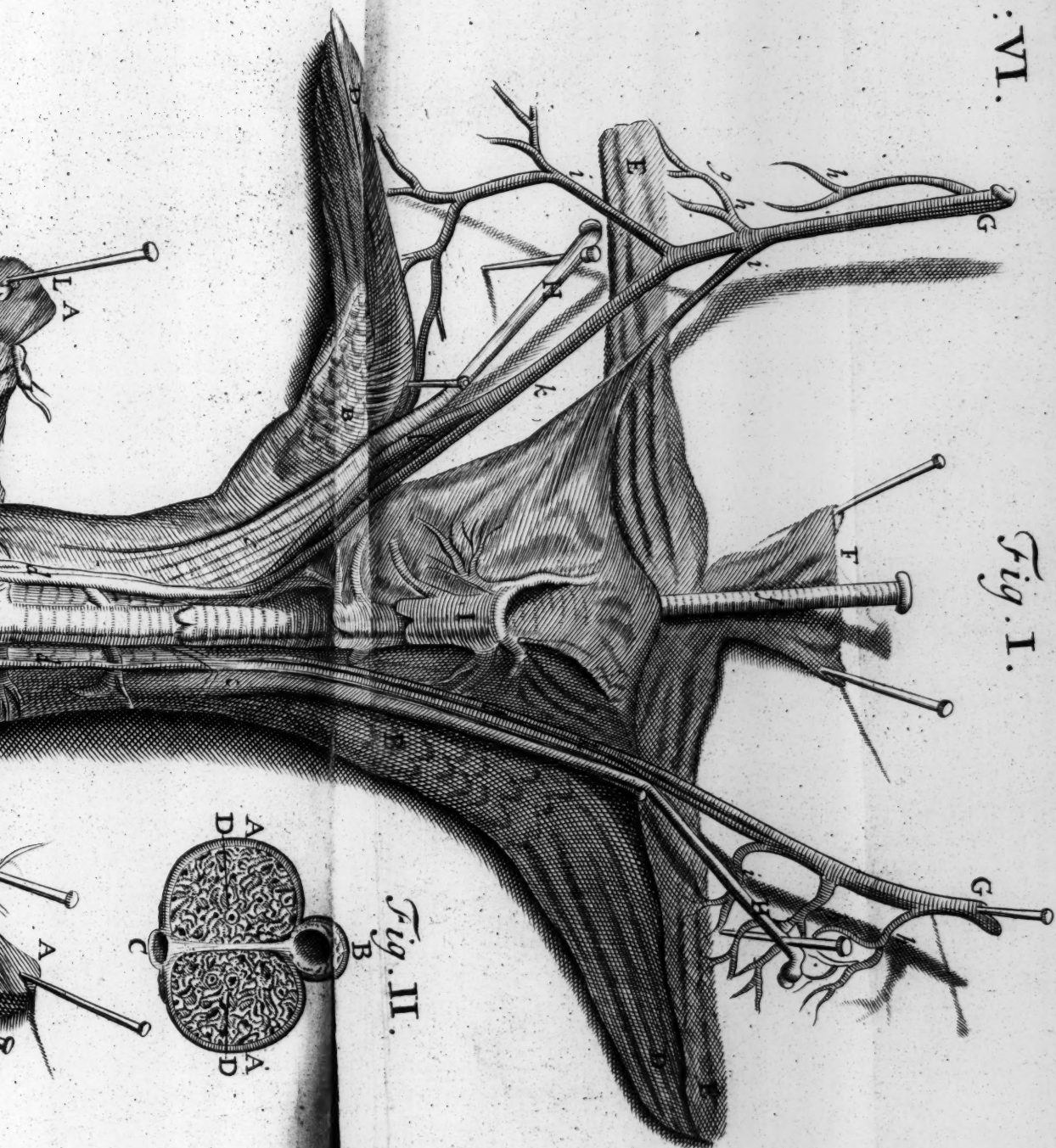
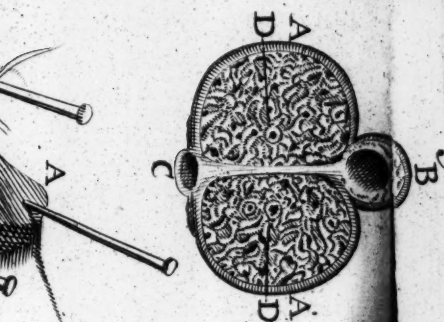
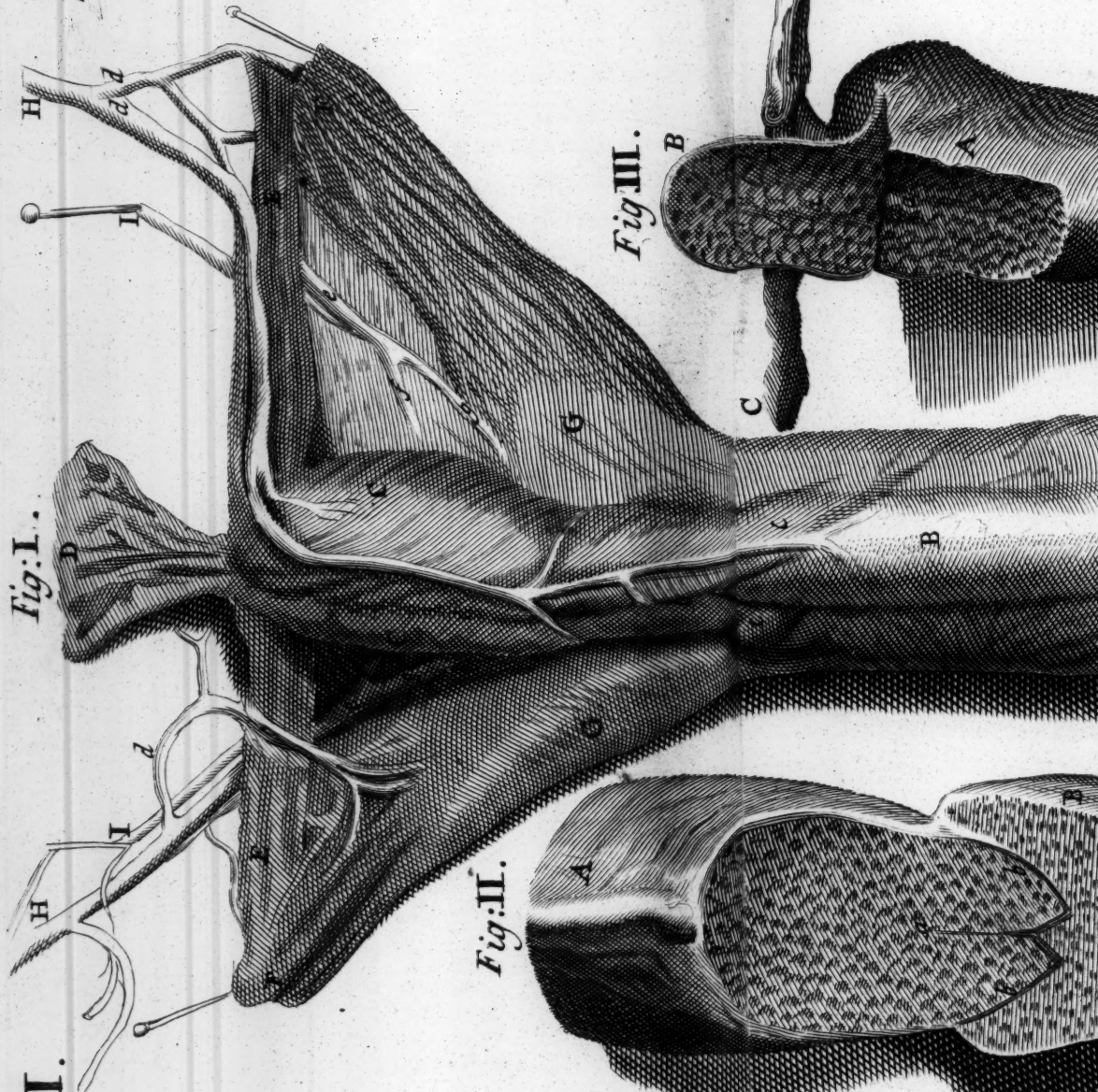


Fig. II.



Tab:VII.

Fig:I..



p. 145

Fig:II.

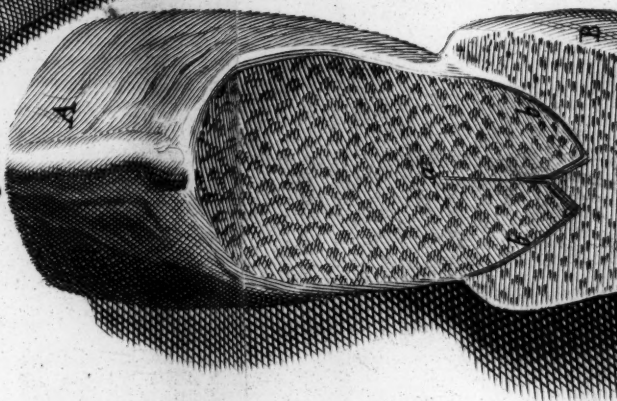
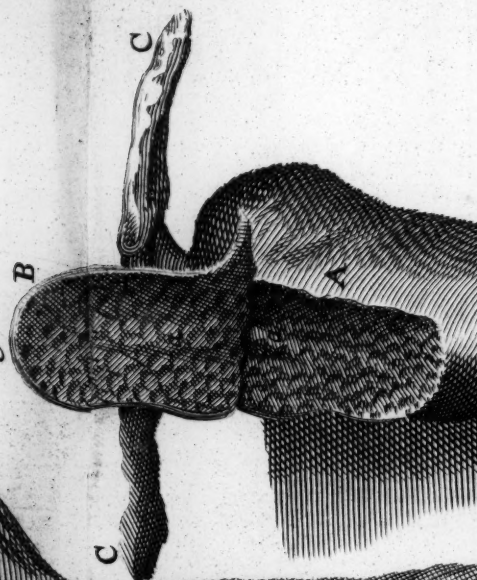
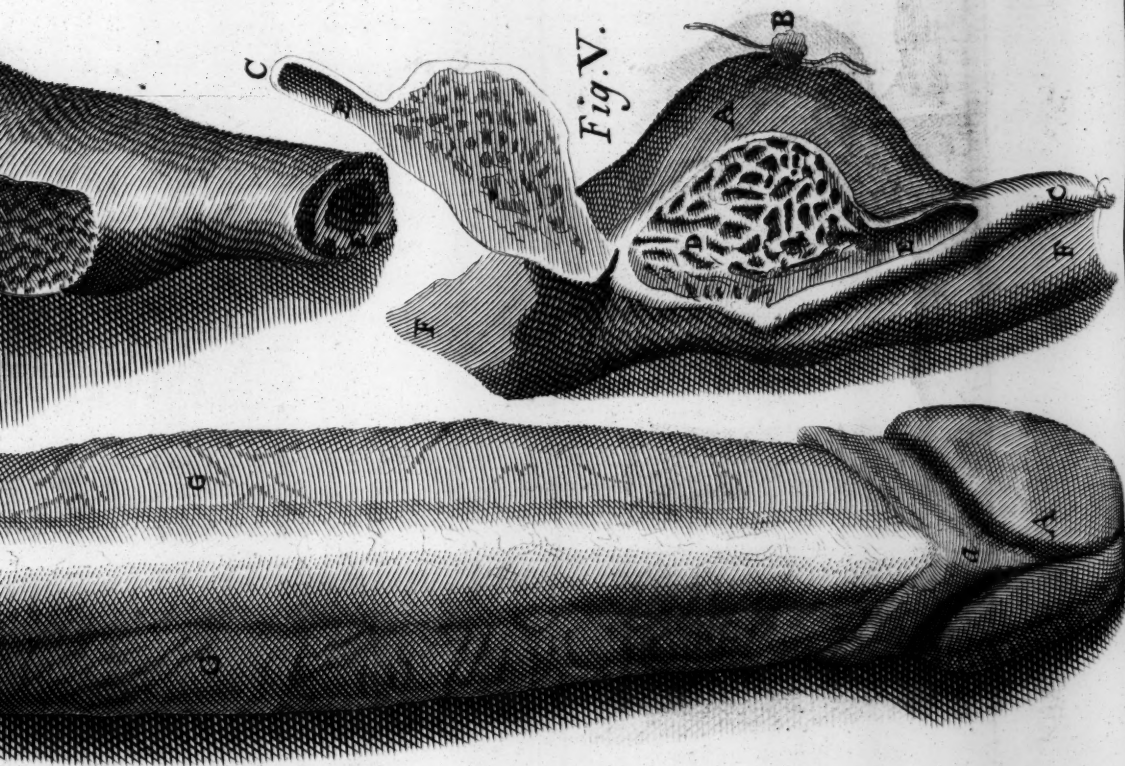


Fig:III.





T A B. VII.

F I G. I.

THE Back part of the Human Penis.

A, The *Balanus*.

a, The *Frenum*.

B, The External Surface of the *Corpus Cavernosum Urethrae*.

C C, Its *Bulb* cover'd with the *Musculus Accelerator*; b, The Conjunction of its Right side with the Left, corresponding to the Seam of the Skin in the *Perinaeum*; c c, Its two Extremities embracing the *Corpus Cavernosum Urethrae*, which terminate on the sides of the *Cavernous Bodies* of the

Penis it self.

D, Part of the *Sphincter Ani*.

E E, The *Musculi Transversales Penis*.

F F, The *Directores* or *Erectores*.

G G G G, the *Corpora Cavernosa Penis*.

H H, The Arteries; ddd, Those Branches administering Blood to the *Muscles*; e e, Two large Trunks of them which are subdivided into two more, f g.

I I, The Nerves of the *Penis*.

F I G. II.

Shews the Internal parts of the Extremities of the two *Cavernous Bodies*, and that of the *Glans Penis*.

A, The *Dorsum Penis*, cover'd with its *Capsula*.

B, The External part of the *Glans*.

a, Part of the *Septum* of

the *Corpora Cavernosa*.

b b, The Internal Membrane of the *Corpora Cavernosa Penis*, cover'd by the *Glans*.

C, The *Corpus Cavernosum Glandis Penis* on the Extremities of the *Corpora Cavernosa Penis*.

F I G. III.

Exhibits the *Bulb* of the *Cavernous Body* of the *Urethra*, being dry'd after Inflation.

A, The External part of the *Bulb*, divested of the *Musculus Accelerator Urinae*.

B, Part of the *Bulb* raised after Section, to shew its Internal *Cavernous Structure*.

a, *Septum Bulbi*.

C C, *Musculi Transversales*.

L

F I G.

FIG. IV.

S Hews part of one of the Cavernous Bodies of the *Penis*, being likewise dried after Inflation.

A, That part of the *Cap-fila* of the Cavernous Body next the *Os Pubis*, which is here compress'd by the Li-

gature made to retain the Wind.

B, *Musculus Erector Penis*.

CC, The Artery, as it is distributed within the Cavernous Body of the *Penis* on either side.

FIG. V.

R Epresents the *Bulb* of a Dog's *Penis* after Inflation.

A, The external Surface of the *Bulb*.

B, A Ligature made on a Vein that arises from the superior part of it, into which the Veins of the *Præpuce* enter, and may therefore be call'd *Vena Præputii*.

CC, The large Trunk of one of the Veins of the

Penis it self, which in this Animal is double, arising from each side the *Bulb*.

D, The internal Appearance of the *Corpus Cavernosum* of the *Bulb*.

E E, The Cavity of the Vein, which communicates with the *Cavernula* of the *Bulb*.

FF, *Corpus Cavernosum Penis*.

CHAP. XXI.

Of the Organs of Generation in Women.

Hitherto we have follow'd the Method, that the Connexion and Dependance of the Parts upon one another have led us into. But this being a single Subject, and a Specification of the Difference betwixt Sexes, we shall follow the Method of *De Graaf* in it, as the most natural, and the most easy for an Enquirer to follow.

Division.

The PUDENDUM MULIEBRE is divided into Parts External and Internal: The External are those

those which offer themselves to the View without Dissection, tho' some of them require a Diduction of the *Labia* before they can be seen. These are the *Rima*, *Labia duo*, *Mons Veneris*, *Clitoris*, *Nymphae duæ*, the *Exitus* of the *Meatus Urinarius*, and the Orifice of the *Vagina*. External Part of the Pudendum.

The *Rima* is nothing else but the External Rima. Aperture situated below the *Os Pubis*, between it and the *Anus*; and the space betwixt the *Rima* and the *Anus* is call'd the *Perinaeum*.

The Skin on each side of the *Rima* is supported and plumped up with the Fat of the *Membrana Adiposa*, which is here thicker than ordinary, and makes together the *Labia*. Labia Tab. viii. Fig. ii. and iii.

Just above the *Labia*, between the *Inguina* is the space which is call'd the *Pubes*; the middle, and most prominent part of which, has been nam'd *Mons Veneris*, which is a little Protuberance occasion'd by the more than ordinary Collection of Fat under the Skin in that Place. All these parts are cover'd with Hair, as most other parts, where the Miliary Glands of the Skin are larger than ordinary, and cover'd with Fat, usually are. Mons Veneris.

These being absolutely External, are exposed to view without Diduction, and they, as well as the adjacent, have been call'd by variety of Names, which either the Wantonness, or other Humours of Men, have furnished them with: But those being of no service to our present Purpose, we shall omit them, and stick only to the most simple and familiar of them among Anatomists, as Modesty directs us.

In the upper part of the *Pudendum*, just within the *Labia*, is the *CLITORIS*; a Body ordinarily about the size of the *Uvula* when it is not relax'd. But sometimes, by extraordinary Means, and in extraordinary Cases, it will be extended almost to the bigness of the *Penis* of a Man, which Clitoris. Tab. viii. Fig. iii. App. Tab. xxxiii. Fig. vi.

Hermaphroditis.

at all times it resembles very exactly in its Figure, except that it is not perforated. The extraordinary Size of this part, and its Propendence sometimes out of the Body in Infants, makes the Women mistake such Children for that sort of Monsters they call *Hermaphrodites*. Of this sort I had one brought to me upon another Occasion, the *Clitoris* of which hung out of the Body so far, at about three Years old, that it resembled very much a *Penis*, but it wanted the Perforation, and instead of that, just behind it, the Urine issued at a hole, which was nothing else but the corner of the *Rima*, the *Clitoris* filling all the rest of the Orifice: So that the Parents mistook it for a Boy, and as such christned it, and as such esteemed it when it was brought to me. But the Neighbours, who had notice of this Appearance, call'd it an *Hermaphrodite*.

Corpora Cavernosa Clitoridis.

Septum Clitoridis

Crura.

Glans Clitoridis
Tab. viii.
Fig. ii.

Muscles of the Clitoris.

The *Clitoris* consists of two nervous or spongy Bodies, like those of the *Penis*, which have their Origine from the lower part of the *Os Pubis* on each side, which coming together form the Body, which is call'd the *Clitoris*: Which tho' it has no Perforation Analogous to that of the *Penis*, yet has a *Septum*, or Membranous Partition, which runs all along between these two Nervous Bodies, from the *Glans* to its Divarication at the *Os Pubis*, where they are call'd *Crura Clitoridis*, and are near three times as long as the ordinary Trunk of the *Clitoris* it self.

At the End of it is a *Glans*, resembling in Proportion that of the *Penis*, except, as has been said, the Perforation. This *Glans* is covered with a *Præputium*, form'd out of the inner Membrane of the *Labia*.

The *Clitoris* has a Pair of Muscles arising from the *Ossa Coxendicis*, and terminating in its *Crura*, and serving to erect the *Clitoris*. Some Authors ascribe another pair of Muscles coming from the

Sphincter Ani, which are by others thought only to be the Constrictory Muscles of the *Vagina*, and assist in hindring the Reflux of the Blood from the *Clitoris*, &c. in *Coitu*. App. Tab. xxxiii. Fig. vi.

It has Arteries from the *Pudenda*, and its Veins return to the *Hypogastricks*. The Nerves come from the Intercostals, and run in pretty large Twigs along the back of it. Hence it is that it appears so extremely affected in the Act of Coition.

After the Blood-Vessels and Nerves have part- ed with Branches to the *Clitoris*, they are partly spent in a Cavernulous Substance, call'd, by *De Graaf*, *Plexus Reticularis*, that environs the *Pudendum* immediately under the *Nymphæ*, to which they also send Branches. All these parts being fill'd with Blood, do more adequately embrace the *Penis in Coitu*; and by their intumescence they not only force out the Contents of the *Lacune*, or Excretory Ducts of the *Prostatæ*, or *Corpus Glandulosum* in the Neck of the Bladder, but by excluding the external Air, the *Semen Masculinum* is injected to the *Fundus Uteri* and *Fallopian Tubes*; and that more especially, if we consider that the *Parietes* of those Parts are furnished with a vast Number of Blood-Vessels, especially Veins, and on their Intumescence, that the internal Air must be rarified in those Cavities, by which means the *Semen Masculinum* passes to the *Ovaria*. Corpus Cavernosum seu Reticulare Pudendi. Tab. ix. Fig. ii.

The *Nymphæ* or *Alæ*, are soft, spongy, red Bodies, descending from the top of the *Clitoris* (to which they firmly adhere) to the sides of the *Meatus Urinarius*, thereby reaching to about the middle of the *Orifice* of the *Vagina*, where growing insensibly less and less, they disappear: So that their length may be accounted from the *Clitoris* to the middle of the *Orifice* of the *Vagina*: Their Breadth is very uncertain, but in Maids usually about that of half a Finger. They are Nymphæ Tab. viii. Fig. ii.

sometimes found much larger, and are capable of being distended to a great degree, so as to hang a good way out of the Body, and in some, these, as well as the *Clitoris*, have been forc'd to be cut.

Tab. viii. Their Figure, taken together, is a kind of half Oval. Their Substance is soft and spongy, compos'd of Membranes and Vessels loosely cohering, and therefore easily distensible.

Use of the Nymphæ. The Use of them is by swelling in the Act of Coition to embrace the *Penis*, and by their Sensibility to affect the Woman, and mutually to invite to Procreation. They have their Blood-Vessels and Nerves in common with the *Clitoris*.

Orifice of the Vagina. Fig. ii. Just behind the *Nymphæ* is the Orifice of the *Vagina*, which in Virgins, especially such as have not yet had the *Catamenia*, or but very rarely, is very streight, but in those that have had them often it grows larger, but more in married Women, and most in those that have had Children.

Orifice of the Urethra. Just above the Orifice of the *Vagina* is the ORIFICE of the URETHRA, opening with a little Intumescence. It is externally cover'd with a whitish Substance, which is partly Glandulous, and partly Membranous, out of which issues a Glutinous Limpid Matter through certain Ducts, which comes from the inward part of the *Meatus*, and serves to anoint the Extremity of the *Urethra*.

Hymen. Fig. iv. In the Dissection of these Parts, nothing has more exercised the Curiosity of Anatomists than the *Hymen*, who not only differ and contend about the Figure, Substance, Place, and Perforations of it, but even about the Existence it self, which some positively affirm, others as flatly deny. And even *De Graaf* himself, the most industrious and accurate Enquirer into these Parts, confesses that he always sought it in vain, tho' in divers Subjects, and in various unsuspected Ages.

All that he could find was a different Streightness, and different Corrugations, which were greater or less, according to the respective Ages: The younger they were, the *Foramen* being the streighter, and the Rugosities the greater, the former the necessary Consequences of the latter. For as in time the parts grew, the Membranes were extended, and so the Surface of them grew gradually more smooth and plain.

Whether it is to be found in all Subjects, I dare not affirm, but in those few which I have had opportunity to examine, I do not remember to have miss'd it in any Subject where I had just reason to depend upon finding it, if it were constant. The fairest View, which I ever had of it, was in a Maid who dy'd at about thirty Years of Age.

In Infants it appears to be a fine thin Mem-^{Its De-}brane, not very conspicuous, because of the na-^{scription.}tural Streightness of the Passage it self, and of^{App.} the *Foramen*, which, tho' very small, did not al-^{Tab.}low of any great Expansion in so little room, and^{xxxiii.} consequently might appear to *De Graaf* a Corru-^{Fig ix}gation only of the inner Membrane. But in this^{and x.} Subject we found it to be a Membrane of some Strength, furnish'd with carnous Fibres, in Figure round, and perforated in the middle with a small Hole, capable of admitting the end of a Woman's little Finger, situate a little above the^{Situation.} Orifice of the *Meatus Urinarius*, at the Entrance of the *Vagina*.

It is probable that this Membrane, as most others do, grows more distinct, as well as firm, by Age: And that it is sometimes very strong and impervious, may be collected from the History of a Case reported by that skilful Anatomist Mr. Cowper, in his *Explications* of the fifty first Table^{An Imper-} of *Bidloo's Anatomy*. *I was call'd* (says he) *to*^{forate}*a married Woman of above twenty Years of Age,* ^{Hymen.}*whose*

whose lower Belly was distended as if with Child. Upon examining the Pudendum, we found the Hymen altogether impervious, and driven out beyond the Labia Pudendi, in such manner, that at first sight it appeared not unlike a Prolapsus Uteri. In the upper part towards the Clitoris, we found the Orifice of the Meatus Urinarius very open, and its sides extruded, not unlike the Anus or Cloaca of a Cock, and without any difficulty I could put my Fore-finger into the Bladder of Urine. On dividing the Hymen, at least a Gallon of Grumous Blood, of divers Colours and Consistencies, came from her, which was the retained Menstrua. The next Day no less Quantity of the same Matter flow'd, after removing the Pessary which I had put in the Day before. After three or four Days she was easy, and soon after recovered, and within a Year was deliver'd of a healthful Child. Her Husband told us, tho' lying with her at first was very painful to himself as well as her, yet at last he had a more easy Access, which could be no other way than by the Meatus Urinarius.

This History proves that this Membrane is not only a strong Membrane, which could make resistance to that force, which overcame the Meatus Urinarius, and Sphincter of the Bladder which is considerably strong; but by admitting of so great a Dilatation, as to hang *extra Pudendum*, shews that the Structure of it is Fibrous, and consequently capable of great Distensions.

Whether this Membrane be always to be found in unvitiated Subjects, is more than I can pretend to determine. The Scarcity of them in Adult, will not let me presume to decide upon my own Observation, and much less can I do it upon any Agreement of Authors: Among whom I find some, who are most accurate, doubtful about its Existence.

Adjoining

Adjoining, or rather in the Place of this *Hy-* Caruncu-
men in Adults, in whom it is not found, are four læ Myrti-
 little Caruncles, or fleshy Knots, about the big- formes.
 ness of Myrtle-Berries, from whence they are App.Tab.
 call'd *Myrtiformes*, which some suppose to be xxxiii.
 largest in Maids, and by degrees to grow less Fig. xi.
 thro' the use of *Venery*: Others, with more Pro- B.
 bability, in my Opinion, derive them from the
 broken Membrane of the *Hymen*, whose Frag-
 ments shrunk up, they take them to be. Which
 of these is in the right, I am not able positively
 to say, having yet never seen them, where the
 use of *Venery* had not preceded.

The Mosaic Test of Virginity has occasion'd *The Mo-*
 abundance of Speculation about these Parts, con- saical Test
 cerning which, the nicest Enquiries can settle of Virgini-
 nothing certain. Whatever might be depended ty, why
 upon among the *Jews*, in these Countries there too severe
 may not be the same reason to expect those To- fr these
 kens of Virginity, tho' not at all to be suspected. Northern
 For, besides that they married extremely young, Climates.
 as it is the Custom of all *Eastern* Countries so to
 do, (whether a *Hymen* be constantly to be ex-
 pected or not) there are many Circumstances
 which may disappoint such Expectations, even
 in Virgins not vitiated by any Male-Contract, or
 Wantonness of their own. For whatever may
 be the Case of those Countries, in these *Northern*
Climates, the Inclemency of the Air exposes them
 to such Checks of Perspiration, as give a great
 Turn to the Course of the Humours, and drives
 so much Humidity through those Parts, as may
 extraordinarily supple and relax those Membranes,
 from which the Resistance is expected, and from
 which, in hotter Countries, it might more reason-
 ably have been depended upon. Not but that
 those Marks are ordinarily found here, but in
 some that have liv'd long Virgins, or are of very
 delicate Constitutions, the long Course, or ex-
 traordinary

traordinary Turn of Humours that way, may render Men unjustly suspicious, where no real Occasion is given. For in some, who preserve their Virginities a great while, and in others, whom a delicate Constitution exposes to a long or great Course of Humours through those Parts, such a Relaxation may be occasion'd as may deceive and offend those Men, who expect certain Marks of Virginity, especially where a *Hymen* is wanting, which (for any thing that appears to me) may be mis'd oftner than it is found.

*Frustrated
often by
Diseases.*

But even supposing a *Hymen* whole and unbroken, that, and the Membranes of the *Vagina*, may be so relax'd, through a long and great Course of the *Catamenia*, or from the morbid dripping of the *Fluor Albus*, that the purest Virgin may not be able to answer here Mens Expectations from the Mosaical Test, whatever might be just in those hot Countries.

All that is certain in this Case, is, that they who have plainly the Mosaical Signs of Virginity cannot be suspected; the others may, tho' perhaps unjustly. There are other Accidents which may disappoint these Expectations of Virginity, without any trespass on the Woman's part, which, without a History of the Diseases of those Parts, (which it is not our Intention to give here,) it is improper to enumerate.

T A B. VIII. From Swammerdam.

F I G. I.

THE Fore-Prospect of the *Uterus* of a Woman after Delivery.

A A, The *Spermatick Arteries*.

B B, The *Spermatick Veins* distributed through the *Tubes*

and *Fundus* of the *Uterus*.

C C, The *Corpora Pyramidalia*, compos'd of the *Spermatick Arteries* and *Veins*.

D D, The membranous or broad *Ligaments* of the *Womb*,

Tab: VIII.

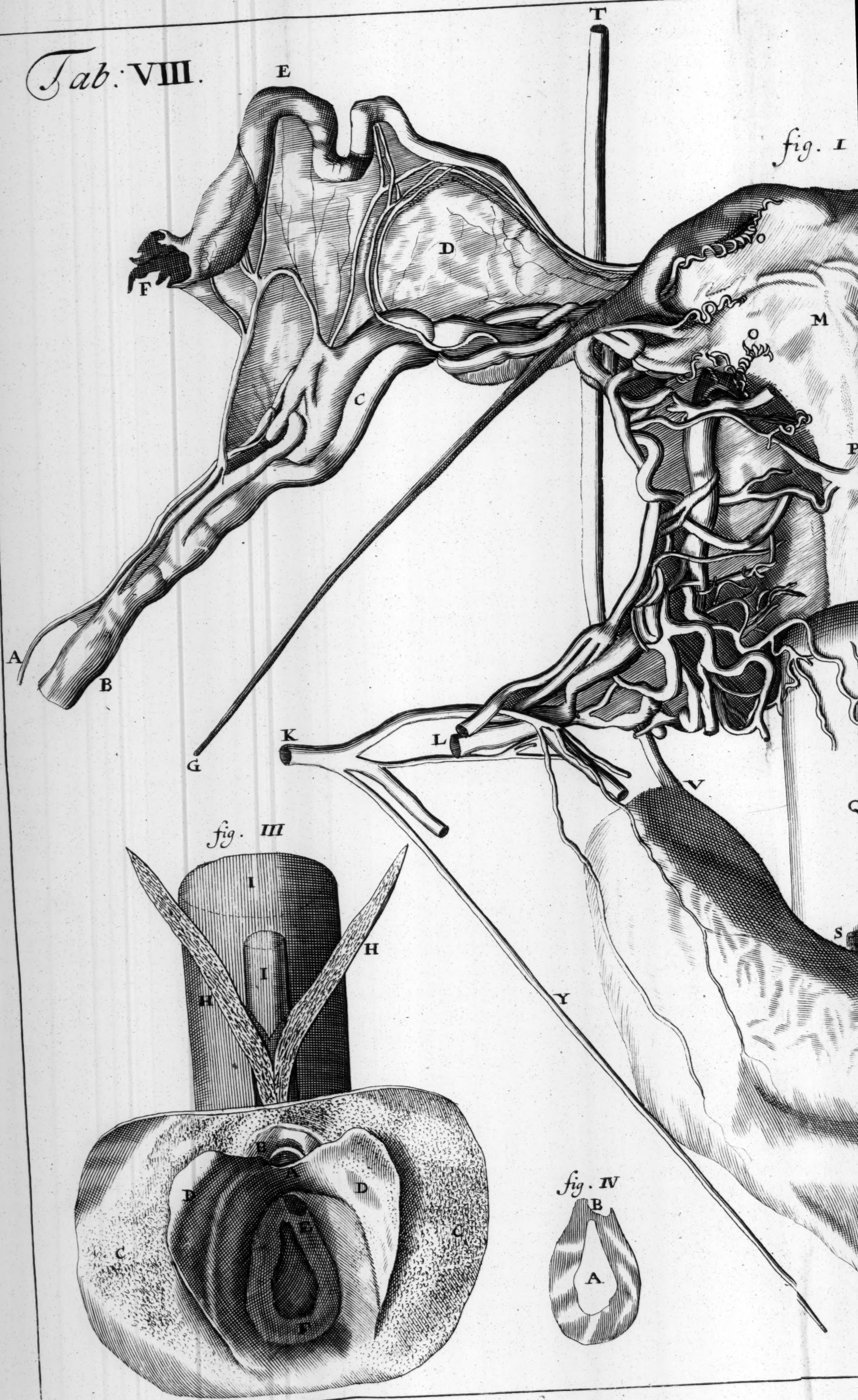


fig. I

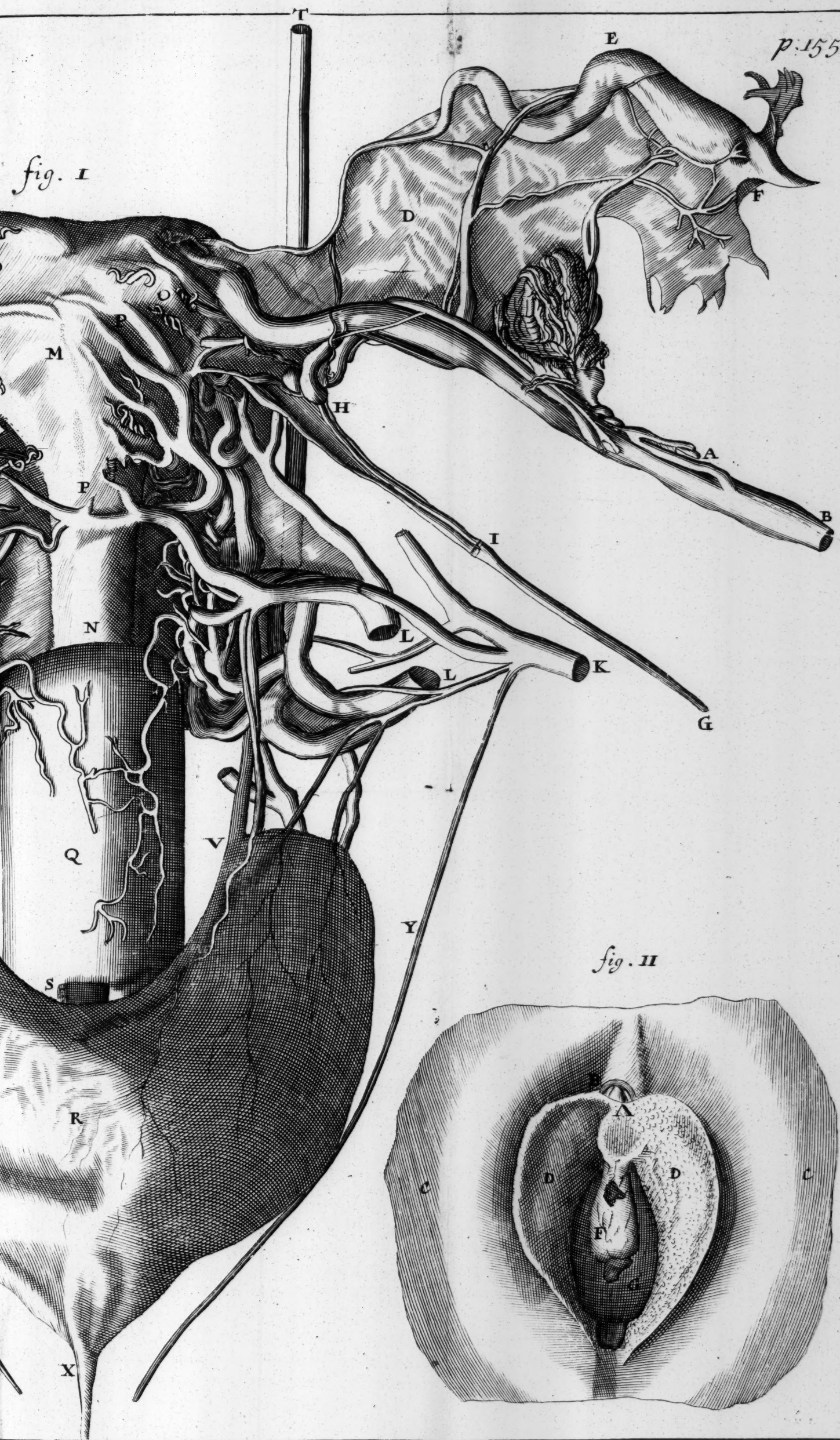
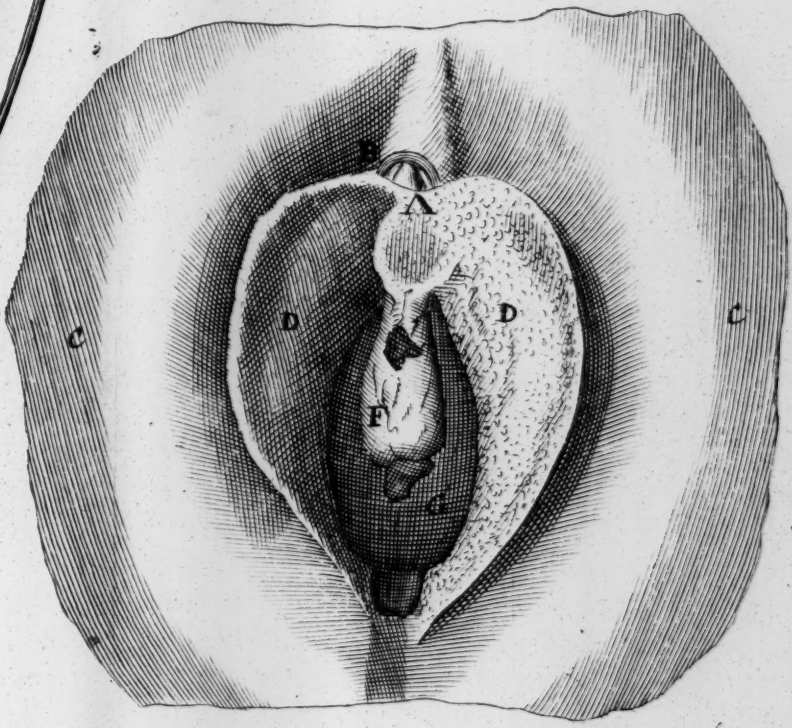


fig. II



Womb, through which the Blood-Vessels pass to the *Fallopian Tubes*, call'd by some *Ala Vespertilionum*.

EE, The *Fallopian Tubes* well express'd.

FF, Their Aperture at the *Expansum Foliaceum*, on each side.

GG, The round or inferior Ligaments of the Womb.

H, The Origination of the Veins and Arteries of those Ligaments.

I, The Valve in the Vein of the round Ligament, hindring the Relapse of the Blood to the *Uterus*.

KK, The two Hypogastrick Arteries.

TT, The Hypogastrick Veins variously contorted, and in their Progress implicated and perplex'd with the Arteries.

M, *Fundus Uteri*.

N, The *Cervix*, or Neck of it, at the end of which is

the inner Orifice of the Womb.

OOO, The Arteries on the *Fundus*, or bottom of the Womb, curl'd like the Tendrils of a Vine.

PP, A great Number of Veins running over the exterior *Tunic* of the *Uterus*, in which the *Anastomoses* are singularly remarkable.

Q, The *Vagina Uteri*.

R, The Bladder of Urine, inverted to shew the Tortuosity of the Arteries of the *Vagina*, by which means its proper Vessels are represented somewhat longer than they ought to be.

S, The Orifice of the *Urethra* in the *Vagina*.

TT, The *Ureters*.

VV, The Insertion into the Bladder, which is here turn'd downwards.

X, Part of the *Urachus*.

YY, The Umbilical Arteries.

FIG. II.

EXhibiting the *Pudendum* of a Virgin, taken fresh out of the Body, and display'd.

T, The *Glans* of the *Clitoris*, resembling that of a *Penis*.

B, The *Præpuce* of the *Clitoris*.

CC, *Labia Pudendi*.

DD, *Nymphae*.

E, The Orifice of the *Urethra*.

F, The *Caruncle*, that closes the *Meatus Urinarius*, in which are divers *Fissures*.

G, The *Hymen*.

FIG. III.

THE *Pudendum* of a Virgin, with its *Clitoris* dried.

T, The *Glans* of the *Clitoris*, answering that of a

Man.

B, The *Præpuce* of that *Glans*.

CC,

- C C, *Labia Pudendi.*
 D D, *Nympha.*
 E, The Orifice of the
Meatus Urinarius.
 F, The *Hymen.*
 G, The Perforation of
 the *Hymen.*
 H H, The *Crura* of the
Clitoris cut to shew the Sub-
 stance of its *Cavernous Bo-*
dies.
 I, The Urinary Passage
 cut off near the Bladder.
 K, The Neck of the *Ute-*
rus cut off.

F I G. IV.

- A, THE Perforation, or
 Slit of the *Hymen.*
 B, The upper part of the
Hymen next the *Meatus U-*
rinarius.

Meatus
 Urinari-
 us.
 App.Tab.
 xxxv.
 Fig. i.

The *Meatus Urinarius* in Women is very short :
 It is lin'd internally with a very thin Mem-
 brane, and next to that is a Coat of a white Sub-
 stance, of which an account is given in the Des-
 cription of the Orifice : Through this Coat, from
 some *Lacuna* in it, those Ducts pass, which con-
 vey the Liquor spoken of before in the account of
 the Orifice. It is very dilatable, as the Practice
 of Extraction of Stones, (of extraordinary Size)
 without cutting, proves ; as well as the History
 before recited under the *Hymen.*

Vagina
 Uteri.

App.
 Tab. ib.
 Fig. ii.

The *Vagina* of the *Uterus*, is a Membranous
 part, reaching from the *Rima* just above the *La-*
bia, to the Neck of the *Uterus* ; It lies upon the
Intestinum Rectum, to which it firmly adheres,
 and under the *Vesica Urinaria*. It is reckon'd to
 be seven or eight Inches long.

Substance.

The inward Substance of it is Nervous, and
 exquisitely Senfile : The outward Membranous,
 and of a loose Texture, with carnous Fibres run-
 ning longitudinally upon it.

Orifice.

At the Orifice it is much narrower than else-
 where, particularly in Virgins, especially very
 young ones. Through the whole Course of it,
 it appears to be wrinkled, especially on the upper
 internal Surface. The Use of *Venery* renders
 these

these *Rugæ* less apparent ; and frequent Parturi-*Rugæ*.
tion almost obliterates them ; which shews that
they were contriv'd to render the Part more easi-
ly distensible for Parturition.

Along the whole Tract of the *Vagina*, there are a great many Pores, or *Ostia*, or little Ducts to be seen, which in Acts of Venery, emit a Li-
quor, that has been by many mistaken for Seed, and are found in greatest Plenty about the lower part of it, especially about the *Exitus* of the *Meatus Urinarius*.
Ostia Vaginæ. App. Tab. ib. Fig. ib.

The *Vagina* has likewise a Constrictory Muscle inserted under the *Clitoris*, which, with a broad Series of Fibres embraces, and constricts the lower part of the *Vagina*, spoken of before.

The *Uterus* or *Matrix* is situated in the *Pelvis* of the *Hypogastrium*, between the *Intestinum rectum*, and the Urinary Bladder. It is surrounded and defended by mighty Bones, before by the *Ossa Pubis*, behind by the *Os Sacrum*, on each side by the *Os Ilium*, and *Ischium*. It is in Figure something like a flat flask, or a dry'd Pear. In Women that are with Child, it receives different Forms, according to the different Times and Circumstances of Gestation.
Uterus Tab. ib. Fig. ib. Its Figure.

In Maids and Old Women long past their *Menses*, it is pretty near of a Size. It is divided by Anatomists, as all other Cavities of this kind are, into the *Fundus* and *Cervix* : A broad Part, and a Neck : And is in Extent from the Extremity of one, to that of the other, about three Inches in length. Its Breadth at the *Fundus* is about two and an half, and its thickness two.
Magnitudo. Cervix. Fundus. Tab. ib. Fig. iii.

It has but one Cavity, unless we make a distinction between the Cavity of the *Uterus*, and that of its *Cervix* or *Neck*. That of the *Fundus* is very small, scarce sufficient to contain a Garden-Bean. At the bottom, or Neck, it grows excessive narrow in Virgins, unless at the time
of

of Purgation, scarce wide enough to admit a Crow's-Quill; The Extremity of which Passage is call'd the *Osculum Internum*. In Pregnant Women it opens more especially towards the time of Delivery. But to obviate the Inconveniencies that might happen by the Womb's remaining open, it is, as it were, seal'd up with a sort of Glutinous Matter, that issues from the Glands about it.

*Orifice of
the Neck.*

Tab. ib.
Fig. ii.

The lower Orifice of the Neck, looking towards the *Vagina*, is a little prominent, and resembles, in some measure, the Glans of the *Virile Organ*. The Substance of it appears to be very firm and compact, yet is nevertheless dilatable to a great degree, as appears by the Exclusion of a full grown *Fœtus*.

*Substance
of the U-
terus.*

*External
Tunic.*

The Substance of the *Uterus* is Membranous and Carnous. It consists of three *Tunics*, or according to some, who deny that Name to the middle Substance, of two only.

*Middle
Tunic.*

The *External Tunic*, which is call'd the *Communis*, is deriv'd from the *Peritonæum*. This consists of two *Lamellæ*, and is pretty thick and strong. The Exterior of these is smooth, the Interior somewhat rugged, and uneven, through the Connexion of the subjacent Parts. This Membrane invests the whole Womb, and connects it to the *Intestinum Rectum*, Bladder of Urine, and other adjacent Parts.

The middle *Tunic* is very thick, and is compos'd of thick strong Fibres variously dispos'd. It seems to be Muscular, and is by some thought to contribute to the Exclusion of the *Fœtus*, and other Contents of the Womb. Tho', in my Opinion, that is not the Office of it; and this, as the Muscular Membranes of other Parts, serves only to recover the Tone after any violent Distension.

The

The Inner *Tunic* is *Nervous*. It is thin, and *Inward* in the *Fundus Uteri* smooth, but in and about the *Tunic*. Neck very much wrinkled, and pierc'd with abundance of little Holes, like the Mouths of Ducts, out of which, upon pressing, issues a clear, ropy Liquor, which probably is that which seals up the Mouth of the Womb, in the time of Gestation.

The *Uterus* is connected by its Neck to the *Vagina*, behind by its outward common Membrane, and before by the same to the *Vesica Urinaria*. Its sides are ty'd to other parts, but the *Fundus* of it is left loose, that it may expand and dilate with more Freedom, according to particular Exigencies. *Connexion.*

The Ligaments are in Number four, two of *Ligament's* them call'd the broad Ligaments, and two Round, from their Figure.

The Broad Ligaments are Membranous, and *Broad Li-* arise from the *Processus* of the *Peritoneum*, from *gaments.* which they branch off about the Loins, and are *Tab. ix.* fastned to the sides of the *Uterus* and *Vagina*, and *Fig. i.* serve to prevent their falling down. They contribute likewise towards the sustaining the *Ovaria Tubæ Fallopianæ*, and other Vessels, which they, as it were, embrace.

The Round Ligaments arise from the sides of *Round Li-* the Womb, at the place where the *Tubæ Fallopi-* *gaments.* *ane* are join'd to it. At their first rise they likewise are broad, but by degrees, as they recede farther from the Womb, they grow round and smooth. *Tab. ib.* And as the Spermatick Vessels do in Men, pass betwixt the Duplication of the *Peritoneum*, and so out of the *Abdomen* thro' the *Foramina* of the Oblique and Transverse Muscles of the *Abdomen*, then running obliquely upon the *Os Pubis*, they there terminate under the Fat near the *Clitoris*. By the Passages of these Ligaments, Women and Girls especially are expos'd to Inguinal Ruptures, as Men

Men are by the Passages of the Spermatick Vessels.

Substance of the Ligaments. The Substance of the Broad Ligaments is Membranous, loose and soft, whence they have been compar'd by some to the Wings of Bats,

Broad. and call'd *Alæ Vespertilionum*; and from the Intertexture of some Fibres, others have mistakenly fancy'd them to be Muscles. After hard Labour, and a forc'd Delivery, these Ligaments are sometimes over-strain'd so far, as not to recover their Tone, whence follows a Propendence at the *Pudendum*, which is term'd *Prolapsus Uteri*. But whether properly so call'd, and that Appearance be a real *Prolapsus* of the *Uterus*, or only a Dilatation, and Propendence of the *Vagina* only, as some would have it, is an enquiry not of this Place.

Round. The round Ligaments are of a firmer Texture, and consist of a double Membrane, wrapping up in it Arteries, Veins, Nerves and *Lymphæducts*, intermix'd with fleshy Fibres, whence some have mistaken these also for Muscles. The Blood-Vessels and Nerves, both in these and the Broad Ligaments, are numerous, and make up a great Part of what is call'd their Substance. These, as the others, serve to keep the Womb in its right Position, and are capable of been injur'd, by the Violence of unskilful Midwives, in hasty, forc'd Deliveries.

Hysterick Passions. By these Ligaments the *Uterus* is kept so tight in its proper Situation, that no Violence of internal *Flatus* or *Humours* can raise it above its place. For as *De Graaf* observes, a Man pulling with both Hands, with all his Strength, cannot raise it above the *Os Sacrum*. This makes appear the Vanity of that Opinion which some have maintain'd after the great *Hippocrates*: That in Hysterick Passions, as they are improperly call'd, the *Uterus* rises, and pressing upon the Stomach and

Diaphragm

Diaphragm causes that Sense of Suffocation which Women feel in such Affections: An Error pardonable in the Times of that great Philosopher, when Anatomy was but rude, but not to be forgiven in Modern Physicians, who have the Means of knowing at the Expence of others Labour, (if they would take the Pains to read) the Absurdity and Impossibility of that Notion.

On each side of the *Fundus* of the Womb arises *Tubæ* a Duët, which opens into the Womb with a very small Orifice, scarce admitting a small Style, ^{Fallopianæ.} ^{Tab. viii,} or a Knitting-Needle, but in its Progress its Capacity grows greater, being large enough to admit the End of a Man's little Finger, and towards the end is contracted, and grows small again. At the end next the *Ovaria*, which is at liberty, it is again expanded into a sort of *Foliage*, which is fring'd round with innumerable little Fibres, like a ragged Fringe; which Expansion, when open'd, was thought, by *Fallopianus* the first Decriber, to resemble the end of a Trumpet, and therefore the whole Duët was by him nam'd *Tuba*. ^{ix, x.} ^{Expansum Foliaceum.}

It consists of a double *Membrane*, the outward ^{Membranes.} smooth and even, deriv'd from the common Membrane of the *Uterus*: The Inner, which springs from the inner Membrane of the Womb, is very much corrugated, more especially at the Extremities. That farthest from the Womb at the time of Impregnation, at which time the whole *Tube* is expanded, reaches to, and embraces the *Ovary*: At other times it seems to fall a little short of it, and is only slightly ty'd by a thin Membrane, reaching from the under part of the *Expansum Foliaceum*, to the under side of the *Ovary*. These *Tubes* are above five or six Fingers breadth long.

Both Arteries and Veins are very numerous here, especially the latter, which by Ramifications and Contortions make the main Substance

M

of

Tab. x.
Fig. ii.

of them, which is a kind of Reticular or Cavernous Body, consisting almost wholly of Blood-Vessels, not unlike that of the *Pudendum*, or *Clitoris* before described. This Structure makes it capable of Dilatation and Contraction, according to the Quantity and Stop of the irruent Blood, and consequently of being erected (if I may use that Term) *in Coitu*, and of embracing the *Ovarium* at that time, which in its State of Flaccidity it did not reach.

No
Valves,
nor Cells.

Dr. *Wharton* has ascrib'd *Valves* to them, and others have divided them into *Cells*: But tho' both are to be found in the *Cornua Uteri* of some Brutes, they are not to be met with in the *Tubes* of Women, which have but one Cavity a little dilated in the middle, and no *Valves*.

Ovaria.
Tab. x.

Near the ends of these *Tubes*, about two Fingers Distance from the *Uterus*, lie the *Ovaries*, or *Testes Muliebres*, so call'd from their Use, which was formerly supposed to be analogous to that of the Testicles in Men.

Connexion.

They are connected to the Womb by a strong Ligament, call'd by many Anatomists *Vas Deferens*, upon Supposition that it was a Vessel which convey'd the Seed to the Womb, and in some measure likewise by the *Tubæ Fallopianæ*, and by the broad Ligament. About the Region of the *Os Ilium*, they are fasten'd to the *Peritonæum* by means of the Spermatick Vessels, and the Membranes which cover them, by all which the *Ovaries* are kept suspended about the same height with the *Fundus Uteri* in Women not pregnant. In Pregnants they rise along with the *Uterus*, but not quite so high as that does in the last Months of Gestation.

Figure.

Their Figure is not so round as the Male *Testes*, but is a kind of Semi-oval: Gibbous on one side, and depress'd on the other, with a Superficies something

something uneven, thro' the unequal Protuberance of the *Ova* which they contain.

They are of different Magnitudes in the different Stages of Life. At the time of Puberty, when they are at their largest, they weigh ordinarily about a Dram and an half, and are about half the bigness of a Man's Testicle. In the Flower of Age they are Plump and Succulent, but as Age comes on, they wither and shrink by degrees, and grow hard and dry, so as sometimes at last to weigh not above a Scruple. Some Anatomists have affirm'd, that these, as Glandulous Parts, like the *Thymus*, were bigger in Infants, and decrease gradually after Birth; but *De Graaf*, who weigh'd many of those of new-born Children, says, he never found them weigh otherwise than between five and ten Grains.

They are cover'd externally with a common Membrane from the *Peritonæum*, to which some add a proper Membrane.

The Membrane being taken away, the Substance appears whitish, compos'd of a multitude of thin little Membranes, and slender Fibres, interwoven with a great Number of Arteries, Veins and Nerves.

Among these Fibres, Membranes and Vessels, are found interspers'd a number of little round Bodies, like Bladders, full of a limpid Substance like the White of an Egg, which boyl'd acquire the same Colour, Taste, and Consistence, with a boyl'd White of an Egg, from which Similitude, as well as from the Analogy of their Use, (being taken for the material Principle of Generations) they are now commonly call'd *Ova*, or Eggs, and the *Testes* in which they are contain'd *Ovaries*.

These Eggs are of very different Magnitudes in the same Ovary, tho' the biggest in a Woman seldom equals the size of a white Pea. They

are so numerous, that *De Graaf* has told above twenty in one *Ovary*. These Eggs have been found by Anatomists in the *Ovaries* of almost all sorts of Animals, and are not doubted to exist in the Females of all sorts of Animals whatsoever.

Hydatides.
Vide
Tab. ix.
Fig. i. e.

Besides these Eggs, there are sometimes found another sort of watry Bladders, which are supposed to be preternaturally there, because they are found but now and then, and sometimes bigger than the Eggs themselves. These are call'd *Hydatides*, and are probably the beginning of a Dropsy, commenc'd in this Part by the Eggs, and perhaps are no other than the *Hydropical Eggs* themselves.

An Hydropical
Dissection.

It is not unlikely that all those Dropsies of the Belly which Women labour with under the fallacious Name of Tympanies, have their first rise in these Parts. I have been present at the opening of several, and have always found the *Ovaria* distended with Water to an incredible Magnitude (tho' not always equally on either side) but especially in one, when a Gallon or more of Water was taken out of one Testicle, and the Membranes of the Testicles, after the Water taken out, so enlarg'd and thicken'd, that it appear'd by Hand to weigh some Pounds, but not having weigh'd it in Scales, we cannot tell the exact Weight of it.

Blood-Vessels.
Superior

Tab. viii,
iv. x.
Fig. i.

The Blood-Vessels that go to the *Uterus*, and the appending parts, are divided into Superior and inferior. The SUPERIOR are the same that are call'd in Men the *Spermaticæ*, and *Vasa Præparantia*, and have their Origines from, and Exit into the *Aorta* and *Cava*, as the Vessels of Men have. But not being sent out of the Abdomen, their course is shorter. The Branches which they distribute into the *Uterus* and *Vagina*, are larger and

and more in number, than those that go to the *Tubæ Fallopianæ* and *Ovaria*.

The INFERIOR are Branches of the *Hypo-Inferior*. *gastricks* and *Hæmorrhoidals*, and only scatter themselves upon the lower part of the *Vagina*. Tab. x. Those before-mentioned are pretty large, and are Fig. i. distributed all over the *Vagina* and *Uterus*, running after an irregular manner with abundance of Contortions, and joining very apparently by perfect *Anastomoses*, Arteries with Arteries, and Veins with Veins, as blowing into them, or Injections with any Liquor shew, especially the Injections of Wax.

But in the times of Gestation these Vessels *Distended* grow very large, and plainly shew, even with-^{in the} out Injection, their Communication, some of ^{time of} them being large enough to admit of a Swan's on. Quill. Tab. viii.

They receive Nerves from the *Par Vagum* ^{x.} and from the *Cauda Equina* in the *Os Sacrum*. Fig. i.

Monfieur Nuck has given us an accurate De-^{Nerves.} scription of the *Lymphæducts* of the *Ovaria*, in ^{Lymphæ-} his *Adenographia Curiosa & Uteri Fæminæ Anatome Nova*: They arise from the Surface of the *Ovaria* by several Branches, which unite and make three Branches on each side, and partly empty themselves into the *Lymphatick Glands* below the Emulgent Vessels, whence other exporting *Lymphæducts* arise, and empty themselves into the *Receptaculum Chyli*; others empty themselves immediately into the *Receptaculum*.

T A B. IX. From Swammerdam.

F I G. I.

SHEWS the Uterus of a Virgin.

A A, The *Spermatick Vessels*, from their Rise to their Dissemination through the *Ovaria*, *Tubes*, and *Fundus Uteri*.

BB, The *Corpus Pyramidale* on each side, compos'd of Branches of the *Spermatick Artery* and *Vein*.

C, The left *Testicle*, or *Ovary*, cover'd with its proper Membrane, thro' which Eggs appear protuberant.

D, The Distribution of the *Spermatick Artery* and *Vein* upon the left *Ovary*.

EEEE, The Branches of the same *Vessels* marching over the membranous Ligaments, or *Ala Vespertilionum*, to the *Tuba* on each side.

FFFF, The *Spermatick* and *Hypogastrick Vessels*, which run curling together along the sides of the Neck of the Uterus, under the *Tubes* and round Ligaments, and inosculate freely on each side.

GG, The *Hypogastrick Veins*.

HH, The *Hypogastrick Arteries*.

III, The *Anastomoses* of the Arteries express'd.

KKK, The various Implications and numerous Inosculations of the *Vessels* finely-express'd.

LL, The left *Tube*, or

Horn of the Womb.

M, The Aperture of the *Tube*, displayed with its Fringe, resembling the tatter'd edges of a worn Cloth.

N, The Membrane of the *Testis* separated, and turn'd back to shew the *Ova* and the *Spermatick Vessels* going to and from them.

O, The right *Tube* inverted to shew its Capacity, thro' which the *Ova* descend to the Uterus.

P, The Fringe of the right *Tube*.

Q, The *Fundus* of the Womb obscurely protuberant.

R, A *Slit* in the Body of the Womb.

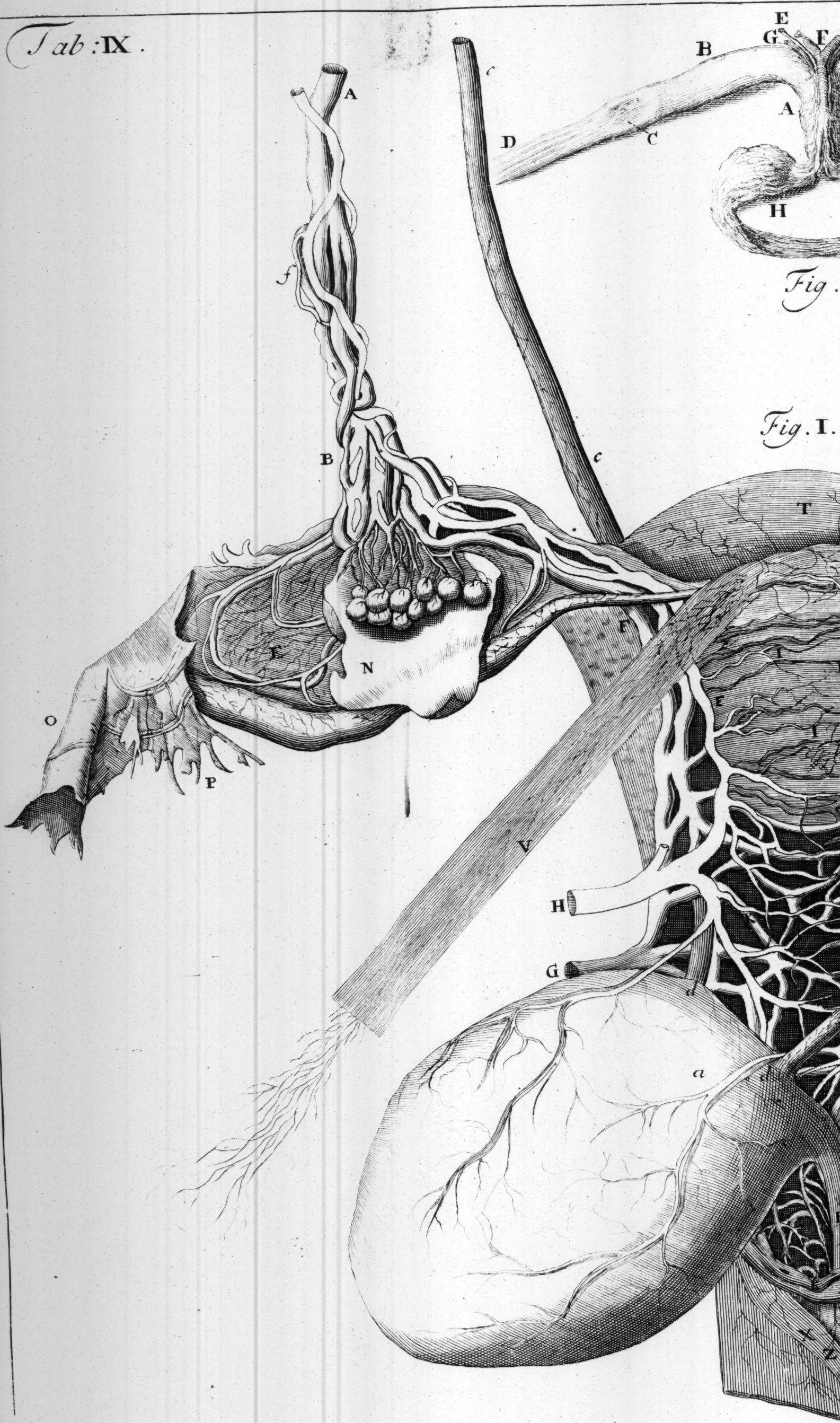
S, The Substance of the Womb, in which appear the Orifices of the *Blood-Vessels* cut transversly.

T, Part of the Membrane covering the *Intestinum Rectum*.

VV, The round Ligaments, which are nothing but the *Arteries* and *Veins* which go to the *Clitoris* and *Pubes*, wrapp'd up in their proper *Involucrum* or *Tunic*.

XX, *Crura Clitoridis*, or its Divarications, call'd by Swammerdam, *Crura Externa*.

YY, The cavernous Bodies of the Uterus, taken notice of by De Graaf under the Name of *Plexus Reticularis*.



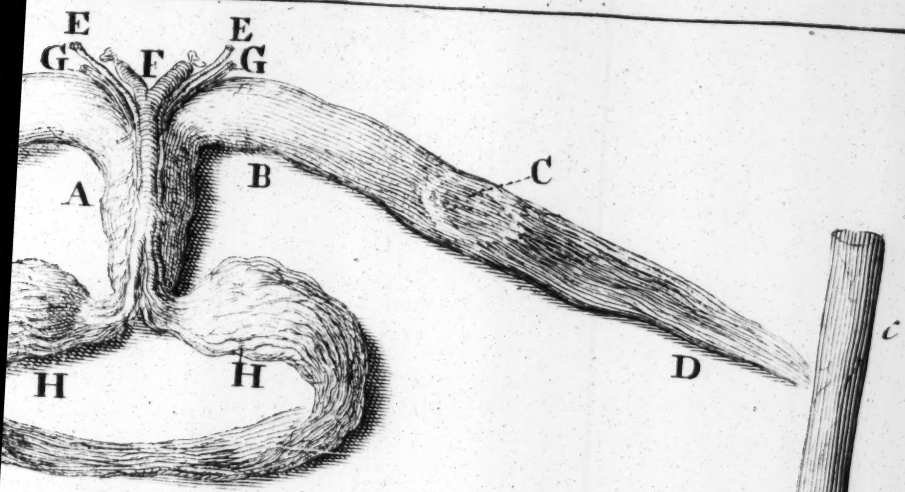


Fig. II.

Fig. I.





laris, but here call'd *Crura Clitoridis interna*.

ZZ, The Vessels of the *Clitoris*

a, The Bladder of Urine turn'd toward the right side.

B, The Insertion of the

Neck of the Bladder, near the *Clitoris*.

CCCCC, The *Ureters*.

dd, The Insertion of the *Ureters* into the Bladder.

ee, A *Hydatis*.

ff, The *Valves* of the *Vein*.

F I G. II.

A, **T**HE Body of the *Clitoris* distended with Wind, as it is with Blood in *Coitu*.

BB, Its *Crura* also distended.

CC, The Extremities of the *Corpora Cavernosa* of its *Crura*, cut from the *Ossa Pubis*.

DD, The *Musculi Erectores Clitoridis*, freed from the

Ossa Coxendicis, and left at their Terminations.

EE, The *Arteries*.

F, The great *Vein*.

GG, The Nerves of the *Clitoris*, which pass likewise to the *Corpus Cavernosum Pudendi*.

HH, The *Corpus Cavernosum Pudendi*, inflated by the *Veins* of the *Clitoris* F.

C H A P. XXII.

Of the Placenta Uterina, The Umbilical Vessels, The Membranes that involve the Fœtus, and the Liquors that they contain, The Situation of the Fœtus in the Womb, The Legitimate time, The Nourishment of the Fœtus, The Difference between a Fœtus before Birth and after.

AFTER Impregnation there is a new Production of Parts, that exist only during the time of Gestation, and afterwards are either discharged, or dry up and disappear.

Of these the Principal is the *Fœtus*, for the sake and use of which, all the rest are form'd. But of that more hereafter.

After the *Fœtus*, the most considerable for Bulk and Figure is the **PLACENTA**, by ancient *Placenta*.

Anatomists call'd *Hepar Uterinum*, for Reasons, which, since the Discovery of the Circulation of the Blood, are out of date. It is something in Figure like a Plate without Brims, about three quarters of a foot over, sometimes a foot. It is round generally, of a Figure *Concave-Convex*. The Concave adheres to the *Uterus*, and is uneven, with divers Protuberances and Pits, by which it made Impressions upon, and receiv'd them from the *Uterus*. The Place of it in the *Uterus*, whatever some pretend, is not certain.

Number.

In Women, unless in case of Twins, or more, there is but one: However, the Number generally answers the Number of the *Fœtus*. In some Brutes, especially in Oxen or Sheep, they are very numerous, (sometimes near an hundred, even for one *Fœtus*) small, and resemble pretty large conglomerate Glands.

Umbilical Vessels.

From the External, or Concave side, which likewise has its Protuberances, tho' cover'd with a smooth Membrane, issue the UMBILICAL VESSELS, which are in great Plenty distributed thro' the whole Substance of it.

The Umbilical Vessels are, two Arteries, a Vein, and the *Urachus*.

Arteries.

The ARTERIES arise from the *Iliacks*, generally near their division into external and internal, and thence pass on each side of the Urinary Bladder, through the Navel to the *Placenta*.

Vein.

The Umbilical Vein, from innumerable Capillaries united into one Trunk, descends from the *Placenta* to the Liver of the *Fœtus*, where it is partly distributed into the *Porta*, and partly into the *Cava*. The Trunk of this Vein, answerable to the Occasion, is above double the Capacity of either Artery. It is sometimes divided before it comes at the *Fœtus* into two Branches, and united again within.

The

The Arteries have in several Places Contortions or Convolutions, which form a sort of Knots, by the Number of which, our Midwives superstitiously reckon the Number of Children the Woman is to have.

Among these Umbilical Vessels may be reckon'd *Urachus*, the *URACHUS*, which, tho' not plainly found, except in Brutes, where it is indisputable, is in my Opinion however reasonably to be allow'd, tho' our Opportunities of Examination not being the same, it usually collapses, and grows so stiff before such Subjects come under our Examination, that we have not a fair Tryal: But the Necessity appearing to be the same, I can little more doubt the Existence of it than in Brutes, where it is exhibited beyond Contradiction.

To these Vessels are continued the Membranes *Membranes of the Fœtus*, which include the *Fœtus*, the interior of which including the *Fœtus*, and the Liquor wherein it lies is call'd *Amnios*, which is a white, soft, thin, transparent Membrane, containing in it a limpid Liquor, like a thin Gelly-Broth; of which the Stomach of the *Fœtus* being always found full, it is probably, in part at least, the Matter of its Nourishment.

On the outside of this is found a thin Humour, *Membrana Urinaria*, that in Consistence and other Circumstances resembles Urine, which, according to Dr. *Needham*, is contain'd in a proper Membrane, which he calls *Membrana Urinaria*, and receives the Discharge of that Liquor from the *Urachus*. But, Subjects proper for an Examination of this Particular being rare, Anatomists have doubted the Existence of this Membrane, and have chosen rather to make it a Duplicature only of the *Chorion*, and to leave the Liquor which it contains (which is no small quantity) unaccounted for, than to allow any thing analogous to the *Alantois* in Cows and Sheep, tho' the necessity appears

appears to be the same. For this they give no other reason, than that the *Urachus* of a human *Fœtus* is not permeable by the *Flatus*, and that the Membrane, which Dr. Needham calls *Urinaria*, adheres in some places pretty closely to the *Chorion*. The first of which may happen generally, because such Subjects are not expos'd time enough to them to make a fair Enquiry; the latter carries no Weight at all with it.

Chorion.

The outward Membrane of the **CHORION** is a pretty thick, strong, whitish Membrane, cover'd with a Multitude of Branches of Veins and Arteries. It is divisible into two *Lamellæ*, whereof the outermost is thick and opaque, the inner thin and transparent. Those that deny the Urinary Membrane divide it into three: The innermost of which is as the outer, likewise pretty thick, contrary to the common Course of Nature, which is some Argument for its being a distinct Membrane.

*Situation
of the
Fœtus.*

Some Anatomists have pretended to give an account of the Posture of the *Fœtus* in the Womb, at the several times of Gestation. But these are so various and uncertain, that such Accounts are little to be depended upon. In the first Month it is of no Moment how it lies in the Womb; in the latter Months, after the *Fœtus* is grown not only Quick, but robust, it frequently changes its Postures of it self, as not only the Mothers themselves feel, but any body, by laying their Hands upon their Bellies, frequently may. However, their ordinary Posture is accounted to be sitting, with the Head uppermost, the Knees brought up between the Elbows, the Feet drawn back towards the Buttocks, the Hands clos'd below the Knees, and the Head dropping, with the Nose, as it were, between the Knees.

When

When the time of Birth draws very near, it ^{Birth.} generally turns it self, and, preserving as to the rest near the same Posture, presents the Head to the *Os Uteri*, which is the most easy and natural Posture for Delivery. When the Midwives find it thus offering, they say it lies right. Sometimes it presents the Feet first, and this way Women are deliver'd, but with great Difficulty and Pain. Sometimes likewise it lies a-cross, offering either a Hand, a Foot, a Knee, or an Elbow, and this way Delivery is impracticable, and unless the Midwife has the Address and Skill to turn it, as they boast that they do sometimes, either Mother or Child, or both must be lost. In this deplorable Case, the Life of the Mother is generally prefer'd to that of the Child, and the Child, by means of Instruments, has been brought away by Piece-meal.

Sometimes the Child dies in the Womb, which if not timely discover'd, and brought away, the Mother runs great Hazard. This sort of Births is not inconsistent with the Safety of the Mother. ^{Delivery thro' an Apoplexion.} *Bartholin*, in a Book *De Insolitis Partus Viis*, relates a great many stupendous Cases of Children dead and putrify'd in the Womb, the Parts of which have made their way through *Apoplexions*; one whereof at the Navel was some Years in coming away, some Bones being discharg'd at long distant times, and making up in all, as he judges, sufficient for the Skeleton of Twins.

Something like this hapned to a Gentlewoman of my Acquaintance, who receiving a great Fright after she was twenty Weeks gone with Twins, found her Belly insensibly to begin to sink on one side, and at length to grow very cold, flaccid, and flat, whilst the other side continued to swell and increase, till the due time of Delivery, when she was deliver'd of a live Child. ^{A putrified Fœtus, and a living one kept together some Months in the Womb.} With it came away

away abundance of foetid, putrify'd, black, and other colour'd Matter, mix'd with the Bones of a Child, which dy'd at the time of that Fright, and remain'd corrupting in the Womb till the time of Delivery. The *Placenta* of the Child which was born alive was very black, discolour'd, and in some measure putrify'd likewise. The Child however grew up to be a Woman, and is now alive, and bears Children, but has been from her Cradle obnoxious to scrophulous Tumours, Ulcerations, cutaneous Eruptions and Swellings. It is probable the Infirmary, to which this Gentlewoman is obnoxious, is owing to a Taint receiv'd from that unhappy Bedfellow in the Womb.

Partus
Cæsareus.

It happens sometimes likewise that the Mother dies, the Child yet living and vigorous in the Womb. In this Case, without Scruple or Delay, the Womb is to be cut open, by which means the Life of many Children has been sav'd, and some not yet come to Maturity for a natural Birth. This way our *Edward* the Sixth was brought into the World, and *Julius Cæsar*, from whom it has been ever since call'd *Partus Cæsareus*.

Time.

The legitimate Time of the Birth has been much controverted, tho' common Observation shews it to be about forty Weeks from the Time of Impregnation; and tho' very frequent Instances of those that go longer, or come sooner, are pretended, yet I believe this to proceed rather from the mistaken Accounts of the Women themselves, than from any Variation in Nature. We do indeed not only read of, but frequently see Births of seven and eight Months, but these may be reckon'd among the untimely Deliveries, and the Child is seldom or never mature, if there has been no Fallacy in the Reckoning. All Creatures have a stated Period for bringing their
Young

Ch. XXII. *Of the Difference of a Fœtus.* 173

Young into the World at Maturity, and why it should be otherwise in Women, no Reason appears.

How the *Fœtus* is nourish'd in the Womb, ^{Nourish-} has been a Question as much agitated among Anatomists as any whatsoever. Some contend that it is nourish'd by the Mouth, others will have it to receive its Increase, and to grow like a Vegetable from the Mother, as from the Root, of which the Umbilical Vessels are the Stem, and the Child the Head, or Fruit of this Plant-Animal, if I may use that Expression. But this Question, and some others, we shall wave here, as containing something of curious Argument, and deserving a more particular Discussion.

There are some Differences in the Structure, ^{Difference} Mechanism, and Proportion of the Parts of a *Fœtus* from those of an *Adult*, of which the Principal are those about the Umbilical Vessels and ^{of the Fœtus before and after Birth.} Liver, and those about the Heart and Lungs. The most apparent of these is the *Funiculus Umbilicalis*, which is a Part that at the Birth is either broken, or cut away to the Navel. Here are two Arteries, and a Vein and *Urachus*, which after Birth become perfectly useless as Vessels, and drying, become impervious, and serve only as Ligaments to suspend the Liver.

In the Liver it self is the *Canalis Venosus*, ^{Canalis Venosus.} which in a *Fœtus* maintains a Communication between the *Porta* and *Cava*, but after Birth dries up by degrees.

In, and at the Heart are the *Foramen Ovale* and *Canalis Arteriosus*, both which serve to maintain the Circulation of the Blood, and to divert it from the Lungs, which in a *Fœtus* are idle and useless, and of a darker Colour, and closer Consistence, than after they have been breath'd into, as appears by their swimming in Water after Birth, which they will not before do. This

Disse-

Difference in the Lungs affords an useful Experiment, in Case of the suspected Murther of Children, for if they were Still-born the Lungs sink in Water; if born alive, they swim. The aforementioned Channels serve only for the use of a *Fœtus*, to prevent that Obstruction the Blood would otherwise have within the Lungs, before they have been open'd. After Breathing has open'd the Lungs, the Blood takes its Course through them, and these Passages close up.

Head.

The Head is much bigger in Proportion to the rest of the Body than afterwards; the Bones are softer, and the Sutures enclos'd, leaving a great Space on the top of the Head, cover'd only with the Membrane, which is afterwards clos'd up with the Bones.

Thymus,
Glandulæ
Renales.

The *Thymus*, and *Glandulæ Renales*, are considerably larger than afterwards, for it does not increase in Proportion to the Age of the Person.

Brain.

Most other Glands are likewise bigger and softer, as the Brain it self is.

There are other Differences which are of no great Moment, and therefore not necessary to be mention'd here.

T A B. X. From Swammerdam.

F I G. I.

S H E W S the back Prospect of the *Uterus* of a Woman after Delivery.

A A, The *Spermatick Arteries*.

B B, The *Spermatick Veins*, which, after sending a number of Branches to the *Ovaria* and *Fallopian Tubes*, have divers notable *Anastomoses* with the *Hypogastrick Arteries* and *Veins*, about

the Neck of the *Uterus*.

C C, The *Arteries* and *Veins* that form on each side the *Corpus Pyramidale*.

D, The left *Testis*, or *Ovarium*, cover'd with its proper Membrane.

E, The proper Membrane of the right *Ovarium* open'd and expanded, to shew the Distribution of *Arteries* into the *Ova*, of which a few only

Tab. X

Fig: I.

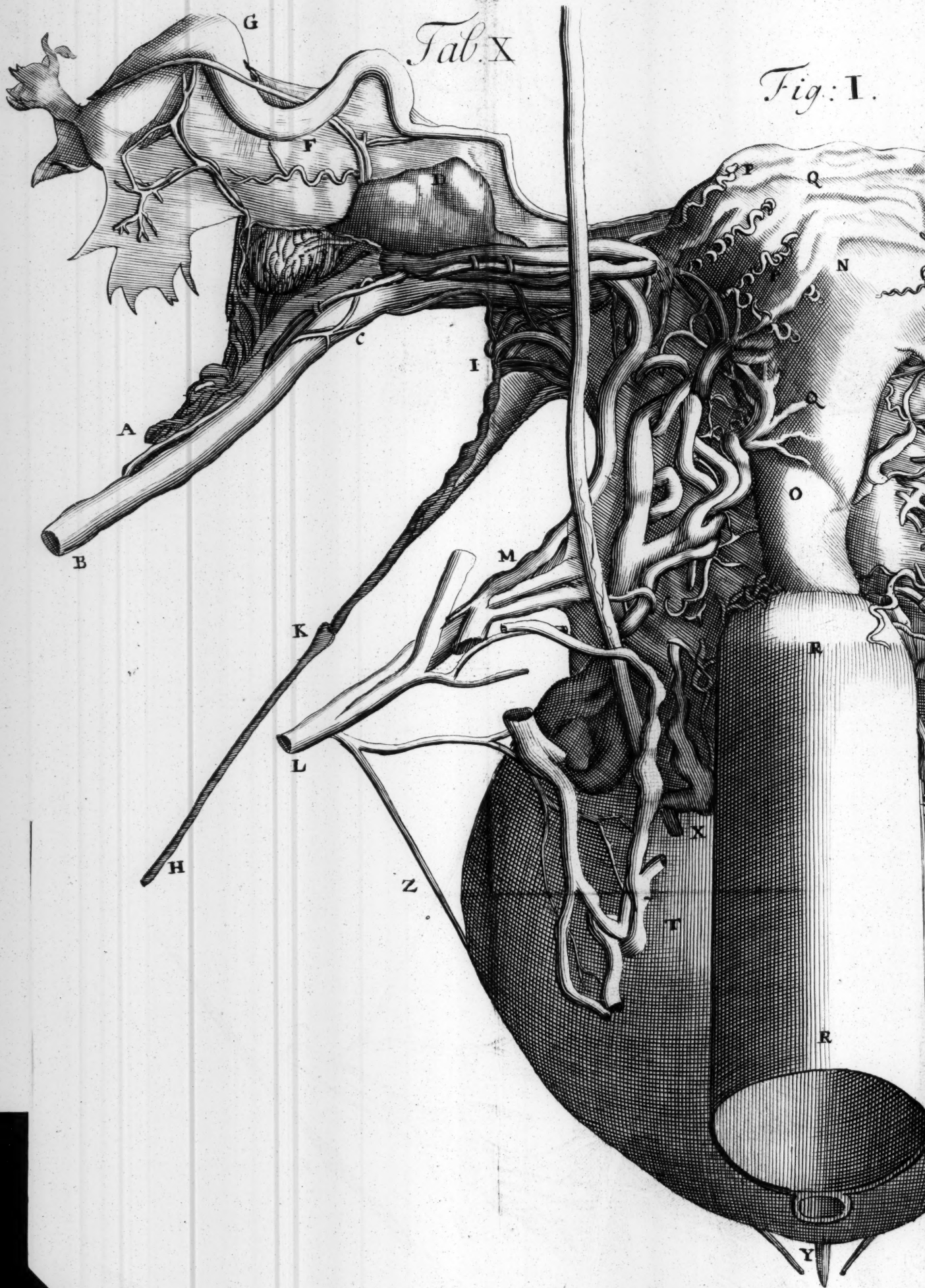


Fig: I.

p. 175

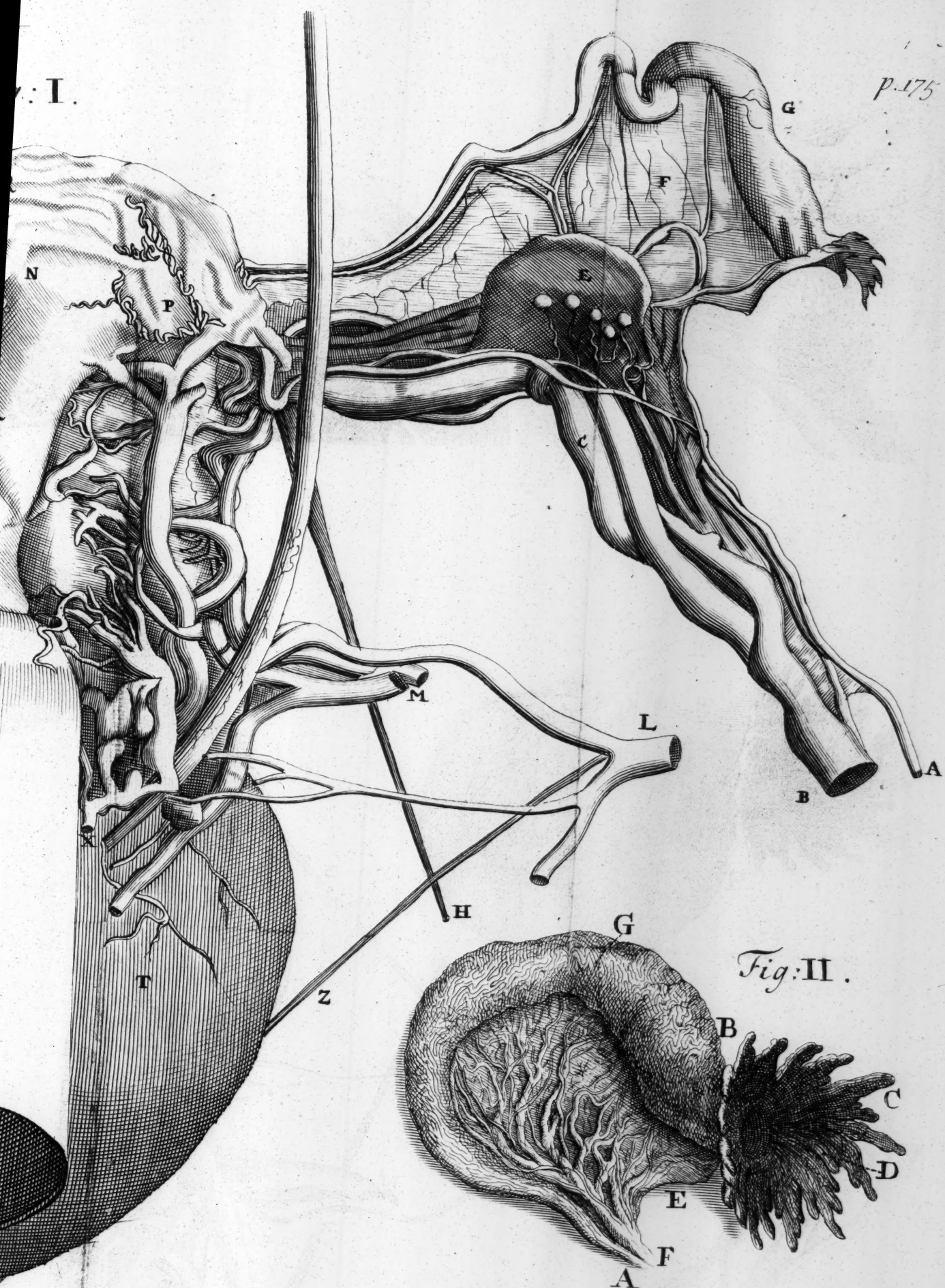
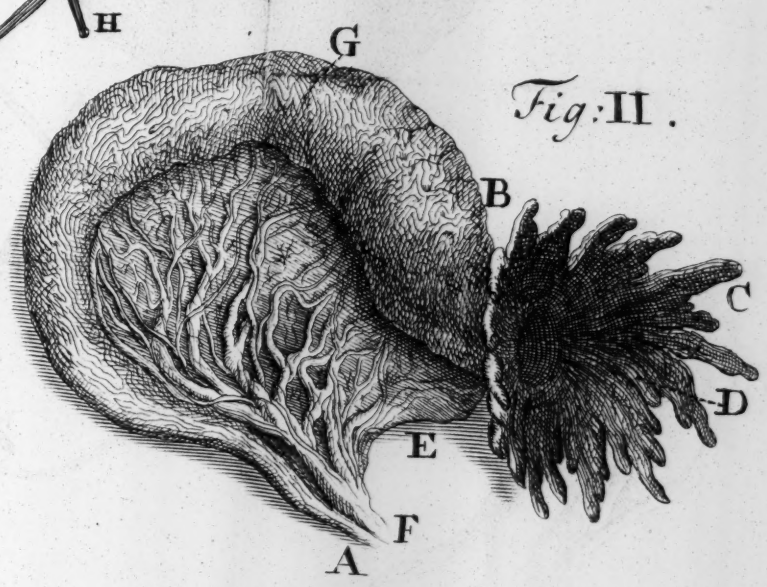


Fig: II.



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only of the least are here figur'd, that they may appear more distinct.

FF, The membranous or broad Ligaments of the Womb, call'd *Ala Vespertilionum*, which the *Spermatick Vessels* traverse in their way to the *Tubes*.

GG, The *Cornua*, or *Tuba Uteri*, reaching from the *Fundus* of the *Matrix* to the *Ovaria*, and serving for the Conveyance of the *Ova* from thence to the *Uterus*.

HH, The round Ligaments of the Womb on each side.

I, The Rise of the *Arteries* and *Veins* of the round Ligaments on the left side.

K, A *Valve*.

LL, The two *Hypogastrick Arteries*.

MM, The *Hypogastrick Veins*.

N, The Body, or *Fundus Uteri*.

O, The Neck of the *Uterus*.

PPP, The *Arteries* on the Body of the *Uterus*, turn'd spirally like the Tendrils of a Vine.

QQ, Numerous *Veins* of the *Uterus* appearing prominent through the exterior Membrane, and shewing divers *Anastomoses* scatter'd up and down.

RR, The *Vulva*, or *Vagina Uteri*, reaching from the outward *Ostium* of the *Pudendum* to the inward one of the *Matrix*.

SS, The *Uretbra*, or proper Channel of the Urine, cut off near the *Pudendum*, together with the *Vagina*.

TT, The lower Surface of the Bladder of Urine.

VV, The *Ureters* descending to the Bladder.

Y, A piece of the *Urachus*.

ZZ, The *Umbilical Arteries*.

FIG. II.

ONE of the *Fallopian Tubes*, with its Blood-Vessels fill'd with Quicksilver and Wind, to shew their Progress on one of the *Ala Vespertilionum*, with the reticular Distribution of the *Veins* on the *Parietes* of the Tube, and its foliated Expansion; whereby these Parts become distended, and are render'd capable each of embracing the *Ovarium* on their own side, in order to convey the *Semen Masculinum* from the *Uterus*, as well as to transmit the impregna-

ted *Ovum* afterwards to its *Fundus*.

A, That part of the Tube next the *Uterus*.

B, Its other Extremity, which is a little contracted before it makes its foliated Expansions.

CC, Its foliated Expansions here distended with Wind, as they are with Blood in *Coitu*.

D, The Orifice at the Extremity of the Tube dilated.

E, One of the *Ala Vespertilionum*, with its

F, *Veins*.

F, *Veins* and *Arteries* continued from the *Hypogastricks* of the *Uterus*; the former, *i e.*

G, The *Veins* making a cavernous or reticulated Body on the sides of the Tube.

C H A P. XXIII.

Of the Catamenia, or Menfes.

Great Differences among Authors.

THE periodical Purgations of Women not with Child, or giving suck, is a *Phænomenon* that has exercis'd the greatest Wits of the Faculty, who after many learned Arguments, and many ingenious Hypotheses, have not been able to come to any Agreement among themselves.

Final Cause.

All Authors agree, that the necessity that Women have for some extraordinary Supply to recompence the Expence, and to support them under it during the Time of Gestation, was the final Reason why this Redundance at other times was given to them.

Fabulous Qualities.

But this is the only Point wherein they are generally agreed. Some, not content with that Occasion alone, will have the menstruous Blood to offend in Quality more than Quantity; which they argue from the Pain it gives many Women in the Evacuation. They say likewise, That the Malignity of them is so great, that they excoriate the Parts of Men by the mere Contact; that the Breath of a menstruous Woman will give a permanent stain to Ivory, or a Looking-Glass; that a little of this Blood dropp'd upon a Vine, or Corn, or any other Vegetable, they become sterile, or blasted; that if a Woman with Child be defil'd with the *Menses* of another Woman, she miscarries; that if a Dog tastes them he runs mad; if a Man, he becomes epileptick; which, with abundance of other such Fables, tho' recounted by many grave, and some great Authors, I reject,

as needing no Refutation, and have only recited them to shew what things have been fuperftitioufly taken up upon Credit, without fufficient Examination, by Men of great Authority, who have been prevail'd upon to believe what the Women at all times would laugh at. Another thing likewise, which we fhall not beftow much time upon, is, the fuppos'd Dominion of the Moon over the Bodies of Women in this Cafe: A Fancy which anciently was the univerfal Opinion, tho' common Experience, with a very little Reflection, might have fhewn the Weaknefs of it. For if this Purgation had been caus'd by any Influence of the Moon, then all Women of the fame Age and Temperament fhould be purg'd according to the fame Periods and Revolutions of the Moon at the fame time, which daily Experience fhews to be falfe.

*Dominion
of the
Moon.*

There are two Opinions however, that are argued with a great deal of Strength and Reason, both which allow the Quality of the Blood to be innocent, but they differ about the Reason of its Issue. Dr. *Bohn*, and of late Mr. *Freind*, a learned ingenious Gentleman of *Oxford*, maintain that this Flux is the refult of a mere *Plethora*, and to be evacuated only for Relief againft the Quantity.

*Hypothe-
fis from a
Plethora.*

Others are of Opinion that this Evacuation is owing to a Fermentation rais'd at that time, and that the Eruption of the Blood in thofe Parts is the Effect of an Effervescence, or Ebullition of the Blood. This Opinion has been maintain'd by many, but its chief Supporters are, the learned Dr. *Charleton* here, the ingenious Dr. *Bayle* Professor of Phyfick at *Tholoufe*, and Dr. *De Graaf*, whom we have had fo frequent Occasion to mention.

Fermentation.

The two firft of thefe fuppose a Ferment peculiar to the Women, which produces this Flux,

N

and

and affects that part only, or at least principally. *De Graaf*, less particular in his Notion, only supposes an Effervescence of the Blood, rais'd by some Ferment, without assigning how it acts, or what it is.

Mr.
Freind's
Hypo-
thesis.

Mr. *Freind* (who has sustain'd the Cause of a *Plethora* with the greatest Clearness and Strength) supposes that this *Plethora* arises from a Coacervation in the Blood-Vessels of a Superfluity of Aliment, which he thinks to remain over and above what is excreted by the ordinary ways, and that Women have this *Plethora*, and not Men, because their Bodies are more humid, and their Vessels, especially the Extremities of them, more slender, and their manner of living generally more unactive than a Man's, and that these things concurring, are the Occasion that Women do not perspire sufficiently to carry off the superfluous alimentary Parts, and that therefore this Overplus must be retain'd in the Vessels, till it be accumulated in such Quantity as to distend the Vessels, and force its way through the Capillary Arteries of the *Uterus*. And he thinks this Discharge to happen in that Part, rather than in any other, because it is more favour'd by the Structure of the Vessels, the Arteries being very numerous, and the Veins very sinuous and winding, and therefore more apt to retard the *Impetus* of the Blood, and consequently, in a *Plethorick* Case, to occasion a Rupture of the Extremities of the Vessels, which may last till by a sufficient Discharge the Vessels are eas'd of their over-load.

This I take to be the Substance of that learned ingenious Gentleman's *Hypothesis*, from whence he very mechanically, and very philosophically, deduces a *Rationale* of the Symptoms.

Plethora
not the
Cause of
Menstru-
ation.

To this *Hypothesis* I could subscribe, did not many Observations convince me that there is no such *Plethora*, or at least, that it is not necessa-

ry to *Menstruation* : For if the *Menfes* were owing to a *Plethora* ſo accumulated, the Symptoms would ariſe gradually, and the Heavineſs, Stiffneſs, and Inactivity, (neceſſary Symptoms of a *Plethora*) would be felt long before the Abſolution of the Period, and Women would begin to be heavy and indispos'd ſoon after their Evacuation, and the Symptoms would encrease day by day. But this is contrary to all Experience, and many Women, who have them regularly and eaſily, have no warning, nor other Rule to prevent an indecent Surprize, than the Meaſure of the Time ; in which ſome that have ſlipt, tho' otherwiſe modeſt and careful Women, have been put to ſuch Confuſions and Shifts, as would not conſiſt with the Notice that a *Plethoric* Body would give.

But even in thoſe who are difficultly this way purg'd, the Symptoms, tho' very vexatious and tedious, do not make ſuch regular Approaches as a gradual Accumulation neceſſarily requires : If we conſider what violent Symptoms will come on in a Day, or an Hour, we ſhall be extremely puzzled to find out the mighty Acceſſion of Matter that ſhould in an Hour or Day's time make ſuch great Alterations. According to this *Hypotheſis*, the laſt contributes no more than the firſt, and conſequently the Alteration ſhou'd be no more ſenſible, excepting the bare Eruption : But it is neither my Buſineſs nor Intention to combat any Man's Opinion. The learned Dr. *Bohn* has ſaid a great deal ; and Mr. *Freind* has rendred this Opinion ſo plauſible, that I wiſh it were true ; and muſt do him this Juſtice, that his is the firſt Account of the periodical Revolution of the *Menfes* that I have met with, philoſophically contriv'd, and like an underſtanding Enquirer. Moſt others have either given trifling or precarious Solutions,

No
gradual
Accumulation of
Matter.

Mr.
Freind's
Hypo-
theſis.
plauſible.

ons, or pass it over as a Difficulty beyond human Understanding.

Fermentation not proved.

The other *Hypothesis* of a Fermentation or Effervescence of the Blood has had much worse Luck: For either it has been stubber'd over as a thing whereof the Fact was certain, but the Reason inscrutable, as *De Graaf* has left it; or established upon an imaginary Ferment, which never was prov'd to exist, and perhaps never will be.

No Receptacle for Fermentation assigned.

The sudden Turgescence of the Blood gave them reason to think, that it arose from something till then extraneous to the Blood: But where to find that they did not know; and therefore had recourse to the Parts suppos'd to be principally affected, and feigned an imaginary Ferment, which no anatomical Enquiry could ever shew, or affirm any reasonable Receptacle for, nor no Reasoning necessarily infer: But on the contrary, both *Autopsy*, and Reasonings from it, conclude against it; since neither the fermenting Matter it self, the Organs by which it should be secreted, nor the Place where it should be repositied, are to be found.

Operation of Emmenagoges.

However, the Heat which accompanies the Turgescence of the Blood, shews that it is not merely *plethorical*, but that there is an extraordinary intestine Motion at that time; which is likewise confirm'd by the Operation of most Medicines conducing to that end, which are most of them such as will give a fermentative Motion to the Blood; or such as will stop an extraordinary Flux of Humours another way, which is one of the ordinary Causes of a defect of the *Menses*. For this Reason *Vitriolick*, and other *Restringent Medicines*, which are sometimes given with Success in Obstructions, as they are call'd, are not strictly to be reckon'd among the *Provocants*, but to the number of those that by rectifying the Tone of the Stomach and Intestines, stop extraordinary Fluxes

Fluxes that way, and by degrees mend and invigorate the Blood, which by fuch Discharges is impoverish'd.

The Suddenness and Violence of the Effervescence, which is fuch as to break out at the Nose, *Hæmorrhoids*, Lungs, Stomach, Eyes and indeed almost any part of the Body, shews, that whatever is the Cause, it is something very active, and that may be introduc'd in quantity in a short time into the Blood, and consequently that it must be ready gather'd in some Receptacle, where, while it was contain'd, its Action was prohibited. For, if it had been scatter'd in the Blood it self, it must either have acted constantly and regularly, and then no fuch critical Evacuation could happen; or it must exert its Power gradually according to its increase in the Blood, and so the Symptoms must have approach'd in the same manner as we have argued against a *Plethora*.

The only Humour which I can find in the Body, so circumstantiated as this *Phænomenon* seems to require, is the *Bile* contain'd in the *Gall-Bladder*. This is a Liquor that probably may have divers Uses, and produce many Effects in an Animal Body, which are yet unobserv'd: But universal Experience agrees that it is capable of raising Disorders, or Fermentations extraordinary, whenever it insinuates it self in quantity into the Blood. And as it is contain'd in a peculiar Receptacle, which seems not to admit of a constant Issue, it may be there reserv'd, till in a certain Period of time the Bladder becoming turgent and full, thro' the Compression of the incumbent *Viscera*, it emits the Gall, which, by the way of the *Lacteals* insinuating it self into the Blood, may raise that Effervescence, which occasions the Aperture of the uterine Arteries.

Farther
prov'd by
Observa-
tions on
bilious
Constitu-
tions.

All Observations agree, that Persons of a bilious Constitution are either more plentifully, or more frequently purg'd this way ; and I my self have observ'd divers bilious Persons, who tho' obnoxious to a *Fluxus Alvi*, which kept them far from a *plethorick* Condition, were however vex'd with a *menstruous Hypercatharsis* : And it is observable, that Men of bilious Constitutions are more frequently troubled with the Piles than others ; and that Distempers manifestly bilious are attended with Symptoms resembling those of Women, who labour under Difficult Menstruation : Their Pulse increases, their Heads ache, they vomit, they have colical Pains, and feel a general Fulness and Stiffness, and are relieved in great measure by bleeding, from most of these Symptoms, which a critical Discharge carries off.

Women abound
with Humours of
all sorts
more than
Men.

It may be objected, that Men abound with Bile as well as Women : But to that Objection I take the Liberty to answer, that they do not, nor with any other Humour that is permanent in the Body, *Semine excepto*. For as in Men the Pores of the Body are more open, and carry off more of the serous part of the Blood, which is the Vehicle of all the other Humours ; so consequently, a greater part of each of them is discharg'd thro' them, than in Women ; in whom the Superfluity must continue to circulate with the Blood, or be gather'd into proper Receptacles, which is the Case of the Bile.

Why not
these Dis-
charges in
Men.

Why not
in Brutes.

The same Argument which holds, why *Menstruation* should not belong to Men, will hold likewise in Brutes ; whose Pores are manifestly more open than those of Women, as appears by the Crop of Hair which they bear ; for the Vegetation of which, a larger Cavity, and a wider Aperture of the Glands is necessary, than where no such thing is to be produc'd. Yet there is a difference

difference in this Point between the Males and Females, even in them: These latter have their *Terms*, tho' not so often as Women, nor in the same Form or Quantity, though Blood sometimes be the result of them.

No Anatomist, that I know of, has yet offer'd a satisfactory Reason, why a sort of Bile, more thin and acrimonious, should be separated into a Receptacle by it self, and not constantly discharged, as that of the *Porus Bilarius* is. They have generally referred it for the use of Chylification; but besides that it appears to be no proper Ingredient of so sweet a Juice as Chyle is, they have but precariously affirm'd it only, and have not given us any necessary, nor to me convincing Arguments, of its Instrumentality in that Case; nor indeed can I help saying, that they have brought it without necessity into an Operation which might be compleat without it.

I think it unnecessary to apply this Hypothesis to the several Phenomena of the Menfes, whether in a natural, regular, or a diseased Case. The Solution of particular Problems, relating to this part of the animal History, flows very readily and naturally from it; and whatever may be urg'd for the Power of a *Plethora*, or of any particular Ferment, may be apply'd without any straining to this. The only Difficulty is, whether the Bile be a sufficient Instrument to produce these Effects; and if it be, whether it does get into the Blood, as I conceive. I shall not swell this Work with Arguments to prove these two Points; for one I think is on all Hands confess'd, and the other I think reasonable to be believ'd: What I deliver, I lay down problematically, with free Liberty to all Mankind to examine it impartially, and shall be as ready to receive the Truth, however contrary to my present Sentiments, as I am now to impart my own Opinion.

C H A P. XXIV.

Of Generation.

*The Cause
of Gene-
ration not
sufficiently
accounted
for.*

TH E *Organs of Generation* have been already describ'd: But there remain some Doubts about the efficient Causes of it, which are not sufficiently adjusted. It is agreed on all Hands, that there are in the *Ovaries* of Women little Eggs.

These Eggs, most modern Anatomists, and the most able till very lately, have maintain'd to be the material and formal Rudiments of the Body of the future Man, which the Seed of the Male did only impregnate and vivify. But that the *Ovum* it self did, before Impregnation, formally and materially contain the Body of the Man, tho' it could not germinate and increase, till rendred prolifick by the Seed of the Male.

*Dr. Har-
vey's Op-
inion con-
cerning it.*

*Mr. Lew-
enhoek's
Opinion.*

*Animal-
cula in
Semine.*

This Opinion was first broach'd, and laid down with Strength of Reason, by our great Countryman Dr. *Harvey*, in his Book *De Generatione Animalium*. It procur'd almost universal Assent from the Writings of that Author, and seem'd perfectly establish'd by *De Graaf*, till the Microscopial Observations of Mr. *Lewenhoek* grafted somewhat upon it, and took something from it.

That ingenious Gentleman, to whose happy Curiosity we are oblig'd for abundance of useful Discoveries, pretends by his Microscopes to have discover'd in the Seed of the Male, as well human, as of divers sorts of Animals, innumerable extremely minute *Animalcules*, moving with great Vigor and Celerity in the Fluid; which he maintains to be Animals of the Species of that Creature whose the Seed is.

The

The Communication of his Observation has mov'd the Curiosity of abundance of other learned Men to make the same Enquiry, with such Glasses as he has describ'd; and by their own Acknowledgments they appear to have done it with the same Success. I have had the same Curiosity, and must confess that the Appearance answered beyond my Expectation, and came up to all the Representations that had been given of it.

The *Animalcules* (notwithstanding the very small compass the Eye can take in at once thro' such a Glass) appear'd in prodigious Numbers, moving with great Velocity, diversly, and, as it seem'd, arbitrarily: Their Figure was exactly like that of *Tadpoles*, and they appear'd in the Liquor black like them, and about the size they are figur'd in the *Philosophical Transactions*, Num. 284. where a Description of them more at large may be found; what I have here said being sufficient for my purpose.

This Discovery has been the Foundation of a *New Theory of Generation*; in which this *Animalcule* is suppos'd to be the entire *Fœtus*, and the *Ovum* before-mentioned to be only a kind of *Matrix*, and to afford a *Pabulum* to the *Embryo*. For notwithstanding this Discovery, the Existence of true *Ova* in viviparous Females is not contested, nor is it indeed contestable.

I should very readily go into this latter Hypothesis, if I did not meet with some insuperable Difficulties (to me at least they appear such) which equally press either Hypothesis. The first supposes the Animal to be entirely included in the *Ovum* before Impregnation, and that the Seed of the Male does only vivify, or give Life and Power of Vegetation, as we said before. The latter affirms the *Embryo* to be entire, perfect and alive in the Seed of the Male; and like the Seed of a Plant, to want only to be cast into a Soil or *Matrix*.

trix, proper for its Increase or Vegetation, which they suppose the *Ovum* to be.

Mongrel-
Breeds, an
Objection
against it. But neither of these *Hypotheses* accounts fairly and fully for mix'd Generation: For besides the vast variety of Mongrel Dogs, begotten betwixt *Sires* of different Species, there have been abundance of Observations of Mixtures of Animals of more remote kinds; such as between a Pheasant-Cock and a Hen; a Bull and a Mare, which has been often enough observ'd to procure a particular Name, and is call'd a *Gimar*; a Cat and a Rat; (of which, however improbable it may seem, there is an honourable Family that can produce abundance of Witnesses;) a Buck-Rabbit and a Guinea-Sow; of which lately I have had a very credible Account. But the most common of all these Animals of mix'd Breed (except the Dogs) is the Mule, begotten by an Ass upon a Mare.

The Fœtus not following the Species of the Mother, shews the form'd Animal not to be contain'd in the *Ovum*. If the *Ovum* contain'd the form'd Animal, then the *Fœtus* ought to follow the Species of the Mother, let the Sire be what it will: Because he contributes nothing but means of Life and Vegetation, the Animal being determin'd beforehand. And the Kind should be as certain as in Plants; where, let the Seed be thrown into what Soil soever, that does not alter the Species of the Plant, tho' it may the growth and vigour of it.

The same Objection to be urg'd against Animalcula in Semine. The same Objection lies yet stronger against the *Animalcules*. For if that *Hypothesis* be true, the *Sperm* of an Ass is full of little Asses; and they being nurs'd by a Mare should never make Mules of them, because the Species is pre-determined, and the Creature not only form'd, but living. I might perhaps as reasonably object, the Similitude that the Children of the same Parents bear to their Ancestors; some to the Father's Line, and some to the Mother's; which plainly shews, that to the Determination of the Species, both Sexes concur; and that sometimes one may prevail, and sometimes

sometimes the other ; which could not be, if both these *Hypotheses* were strictly or absolutely true. I know some endeavour to get over this Objection, by fancying that the different *Matrix* may have so much Effect, as to alter the Figure of the Animal so far, as may account for these mixt Appearances. But this is so poor, so unphilosophical a shift, that it is not worth an Answer ; and they might with as good Authority persuade me, that an Orange-Tree transplanted from *Sevil* to *England* would bear Apples ; and so *vice versa*. It is a common Practice in Gardening, to graft one Fruit upon another Stock : But the Fruit still follows the Species of the Graft or Cyon, and bears like the Parent-Tree, not the Stock it grows upon.

These Difficulties render both these *Hypotheses* unsatisfactory to me ; and however old and exploded the Opinion of a *Plastick Power* on both sides be, I must however embrace it, even tho' I know not exactly wherein it lies ; at least till I meet with somewhat more sufficient to resolve my Doubts than hitherto I have done.

It is however agreed, that tho' the *Ovum* of the Female does not formally contain the Animal, yet in Impregnation that it is a *Causa sine qua non*, and that Generation cannot be without an Egg rightly dispos'd ; and upon that Concession (which I think is at this time universal) I shall proceed to examine some of the principal *Phænomena* of Generation, and the requisite Condition of Fœcundity, without concerning my self farther with the *Animalcules* of either side ; except only to observe, that the Existence of a form'd Animal in the *Ovum* has never been prov'd, but suppos'd only from the Analogy it is imagin'd to bear to the Seed of Plants, in some of which the Figure of the Plant has by the Microscope been discovered. The other *Hypothesis* seems to stand upon

A Plastick Power.

A form'd Animal in the Ovum not prov'd.

*The seem-
ing Ani-
mals may
be only
Particles
of a mix'd
Fluid in
motion.*

on the Foot of *Autopsy*, but Reason, as we have observ'd, seems to be against it : And it is not impossible but that these seeming Animals may be nothing more than some large Particles of a mix'd Fluid, whose Motion and different Figure the Microscope discovers to our Eye, while yet the minuter Parts will not discover themselves, even that way. But we leave these things to the Arbitrement of the Learned.



A NEW

Plates (11.)

1 portrait opp. title
 1 plate opp. p. 28
 1 " " 91
 1 " " 141
 1 " " 142
 1 " " 143
 1 " " 144
 1 " " 145
 1 " " 155
 1 " " 166
 1 " " 174.



